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SELECTING TREES FOR HOME PLANTING.
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DESIGNED FOR USE BY HIGH SCHOOL OR ADULT STUDENTS AS TEXT OR REFERENCE MATERIAL, THIS DOCUMENT PRESENTS TECHNICAL INFORMATION NEEDED IN SELECTING TREES FOR HOME PLANTING. IT WAS PREPARED BY SUBJECT MATTER SPECIALISTS, TEACHER EDUCATORS, SUPERVISORS, AND AN ADVISORY COMMITTEE OF TEACHERS. MAJOR SECTIONS ARE (1) WHAT FACTORS SHOULD I CONSIDER WHEN BUYING TREES, (2) WHAT FACTORS SHOULD I CONSIDER BEFORE BUYING TREES, AND (3) WHAT TREES SHOULD I CONSIDER. THE SUGGESTED TIME ALLOTMENT IS 2-8 HOURS. TEACHERS WITH A BACKGROUND IN GENERAL AGRICULTURE MAY USE THIS MATERIAL WITH STUDENTS OF BOTH SEXES, WHO HAVE AVERAGE ABILITY, AN INTEREST IN AGRICULTURE, AND OCCUPATIONAL OBJECTIVES IN PRODUCTION AGRICULTURE. THIS DOCUMENT IS AVAILABLE FOR 50 CENTS FROM VOCATIONAL AGRICULTURE SERVICE, 434 MUMFORD HALL, UNIVERSITY OF ILLINOIS, URBANA, ILLINOIS 61801. (WB)

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SELECTING TREES FOR HOME PLANTING

1. What Factors Should I Consider Before Buying Trees?
2. What Factors Should I Consider When Buying Trees?
3. What Trees Should I Consider?

1. WHAT FACTORS SHOULD I CONSIDER BEFORE BUYING TREES?

Trees are used for shade, ornamental, screening, windbreak, and sound-proofing purposes. Select a species that is best for your intended purposes.

Select the right species

Trees for shade purposes should be sturdy, long-living species that grow relatively fast and produce the size and shape desired. Also, the density of foliage, which determines the amount of shading, is important. Ornamental trees, in addition to being sturdy and long-living, should produce the desired type of branching or shape, foliage, flowers, and fruits. Trees for screening purposes should grow rapidly and produce dense foliage. Trees to be used as a windbreak (Fig. 1) need to be sturdy, long-living species that will withstand rigorous climatic conditions and develop the desired size and shape for the location in which they are to grow. Any extensive or dense planting of trees will serve as a sound barrier, except that deciduous trees have little or no value for this purpose when they shed their leaves.

Shape is especially important in selecting trees for ornamental and shade purposes. Tall trees with long, spreading or weeping branches give abundant shade. Small trees and trees of other shapes—including the narrow, columnar trees like Lombardy poplar, the pyramidal evergreens, the globe-shaped, dense form of globe elm (Fig. 2), the clump birch (Fig. 3), and the low-growing hawthorn, crabapple, dogwood, and Russian olive—are useful for ornamental purposes but do not give abundant shade.

Fig. 1. Trees planted close together will serve as a windbreak or sound barrier. Evergreens are especially suitable and effective for these purposes.

Fig. 2. The densely branched, smooth-leaved, globe elm is an ornamental tree of unusual appearance.

Fig. 3. The clump birch is used extensively for accent purposes in landscaping.

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The size of the trees you want will depend largely on where they are to be used. Trees that grow tall—such as American elm, hackberry, beetree linden, white oak, sycamore, and tulip tree—are suitable for two-story and larger buildings but they tend to accentuate the low or flat appearance of, or hide, one-story buildings (Fig. 4). For attractive and proper balance with one-story buildings, trees that do not grow over 35 feet tall are recommended (Fig. 5). These smaller trees include redbud, hornbeam, crabapple, hawthorn, mountain ash, and persimmon. Environmental conditions that influence the size of trees to select include size of planting area, underground utilities, septic tank distribution fields, and location of walks and other objects.

Fig. 4. Small or low, flat buildings are dwarfed or hidden by tall trees like the American elm.

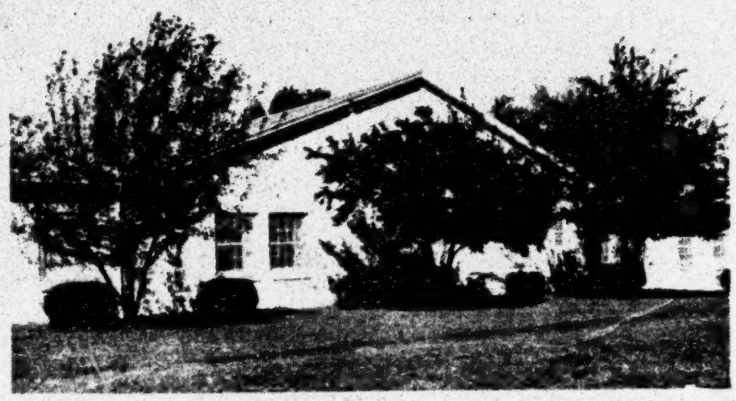

Fig. 5. Low-growing trees that do not exceed 35 feet in height add to the attractiveness of one-story buildings.

Another consideration in selection of species is whether you want trees that produce interesting and attractive foliage (Fig. 6), flowers, fruits, or bark. Flowering trees like crabapple, hawthorn, magnolia, and mountain ash are especially attractive in the spring and provide a distinctive setting for a home. Trees with fruits that attract birds include birch, crabapple, dogwood, hackberry, hawthorn (Fig. 7), mountain ash, mulberry, sassafras (female), and tupelo.

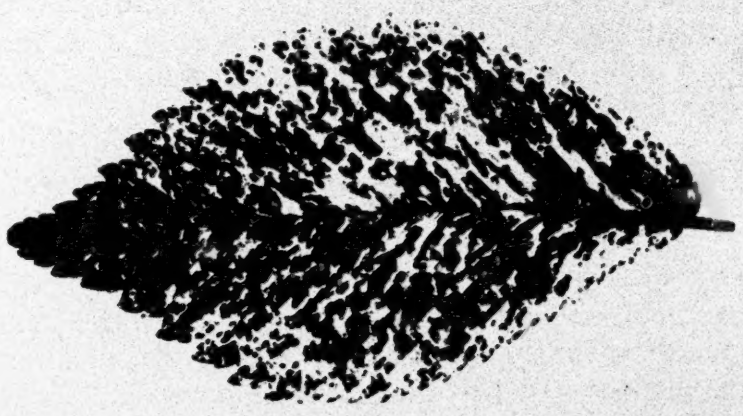

Fig. 6. Leaf of variegated English elm, showing abundant development of irregular white and light green areas interspersed with normal green.

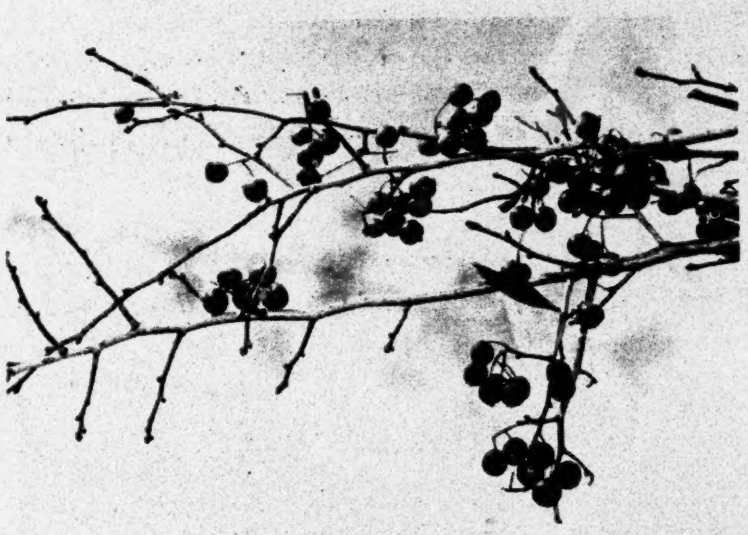

Fig. 7. The red fruit of cockspur thorn is attractive in autumn and provides food for birds.

Trees selected for their attractive foliage color in autumn include those with purple, red, orange, and yellow leaves. Purple foliage develops on white ash and white oak. Red foliage appears on dogwood, hawthorn, tupelo, and several species of oak. Orange foliage

MEMORANDUM

TO: The ERIC Clearinghouse on Vocational and Technical Education
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FROM: (Person) J. W. Matthews (Agency) Vocational Agriculture Service

(Address) 434 Mumford Hall, Urbana, Illinois 61801.

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RE: (Author, Title, Publisher, Date) Selecting Trees for Home Planting, VAS 5001. Urbana, Illinois: Vocational Agriculture Service, University of Illinois. 40 p., 1967.

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appears on sassafras and sugar maple. Although yellow foliage develops on many species of trees, it is more conspicuous on ash, beech, birch, elm, ginkgo, hickory, linden, mountain ash, oak, poplar, redbud, tulip tree, and yellowwood. The leaves of sweet gum may show all four colors—yellow, orange, red, and purple.

Trees with unusual bark color or formation are especially attractive during the winter. The bark may be green, gray, white, yellow, reddish-brown or mottled. Trees with attractive bark include amur cork tree, beech, birch (Fig. 8), hackberry, Kentucky coffee tree, magnolia, red maple, sycamore, white oak, white poplar, and yellowwood.

Fig. 8. The white bark of birch adds to the beauty of the landscape.

Some kinds of trees have disadvantages that make them somewhat undesirable for widespread use, including susceptibility to attack by diseases and insect pests, soft or brittle wood that is easily damaged by wind and ice, fruits and seeds that are large, messy, smelly, or otherwise obnoxious, and abundant shedding of twigs and small branches. Some examples of these conditions are killing of Lombardy (Fig. 9) and Simon poplar by Cytospora canker or by borers, breaking of Siberian elm branches by wind and ice, cracking

Fig. 9. Lombardy poplar trees frequently are killed by a fungus disease, Cytospora canker.

of the trunks of London plane trees because of low temperatures (Fig. 10), and production of ill-smelling fruit by the female ginkgo. The production of fruit by the mulberry, which as previously mentioned attracts birds, can also be an undesirable characteristic. Since this fruit is soft and decomposes rapidly when ripe, it is messy on walks and attracts flies and other insects.

Fig. 10. Cracks which extend into the heartwood are conspicuous in the trunks of some London plane trees during the winter months.

Seek professional advice

Before deciding what species to buy, it is desirable to get the advice of a person familiar with trees. Nurserymen, arborists, and landscape men are familiar with the various species of trees, the purposes for which they are used, and the environmental conditions

under which each thrives. Such individuals can offer valuable advice on selecting the species or kind of tree most suited for a given location and purpose, when and how to plant, and how to prune the newly planted tree. Also, they are familiar with the growth rates of trees, relative sizes and shapes at maturity, and the requirements for best growth. These growth requirements include soil type and acidity, water needs, and whether certain trees grow well in open areas or need partial protection from wind and sun.

Nursery and woodland trees

Trees obtained from commercial nurseries may be grown in the field (nursery grown) or in impervious containers (container grown). Container-grown trees are sometimes kept in the containers for several years, which may cause the roots to become restricted, intertwined, and twisted. Purchasers should avoid this condition; it may be so serious that the trees grow poorly or do not survive when planted.

Nursery-grown trees have many advantages over trees taken from woodland or field locations. Nursery-grown trees are top pruned to produce good shape and root pruned to produce compact, fibrous roots close to the trunks. However, in some nurseries root pruning is not a common practice. The trees are dug by experienced help with a minimum of root injury and usually recover rapidly from the shock of transplanting. Arrangements can be made with many nurseries to replace any trees that do not survive. Local nurseries with experienced workers often plant trees for the purchaser at a nominal charge.

Trees taken from woodland or field locations may survive transplanting and grow satisfactorily. However, many do not survive because such trees frequently have widespreading fibrous roots which are cut off in digging. Without these roots, the trees are unable to take in adequate supplies of water and nutrients. Wild trees that survive may require two or more growing seasons to recover from the shock resulting from the loss of roots. Also, trees growing in dense shade may be spindly and may require severe pruning to produce desirable shapes. Many of them have tender bark which is easily injured by exposure to direct sunlight.

Many states, including Illinois, have laws which require that woodland trees as well as nursery-grown and container-grown trees must be inspected by state authorities and certified to be free of diseases and insect pests. This inspection must be made before the trees are moved.

When to plant

In general, plant deciduous trees in the fall after leaves drop and before the soil is frozen, or in late winter and early spring after the soil has thawed but before the leaves appear. Evergreens are most commonly planted during these same periods. Deciduous trees and evergreens may be planted during the winter or summer if properly handled by trained personnel.

Trees more likely to survive when planted in the spring are:

Bald cypress	Hemlock	Sassafras
Beech	Hop hornbeam	Sourwood
Birch	Hornbeam	Sweet gum
Catalpa	Larch	Tulip tree
Dogwood	Magnolia	Tupelo
Fir	Mountain ash	Willow
Goldenrain tree	Oak	Yellowwood

Trees commonly planted in either fall or spring are:

Arborvitae	Hackberry	Persimmon
Ash	Hawthorn	Pine
Buckeye	Honey locust	Plum
Cherry	Horse chestnut	Redbud
Chestnut	Juniper	Russian olive
Coffee tree	Katsura tree	Serviceberry
Cork tree	Linden	Spruce
Crabapple	Maple	Sycamore
Elm	Pagoda tree	Zelkova
Ginkgo		

Other considerations

Chances of survival. Species of trees that survive and recover from transplanting shock more readily than others include ash, catalpa, cork tree, crabapple, elm, hackberry, honey locust, linden, maple, pin oak, poplar, sycamore, tree of heaven, and willow. Species that survive and recover from transplanting shock less readily include beech, hickory, hornbeam, sassafras, sweet gum, tupelo, walnut, and white oak. The remaining trees described fall between the above two groups in relation to survival.

Soil pH requirements. Tree growth is influenced by the acid or alkaline reaction of the soil. Most trees grow best in soils that are slightly acid, pH 6.0 to 7.0. However, many trees like ash, catalpa, elm, hackberry, linden, sycamore, walnut, white oak, and yellowwood, which prefer a slightly acid soil, will tolerate alkaline soils with pH reactions as high as 7.5. Some trees, such as Douglas fir, flowering dogwood, ginkgo, pin and red oak, red cedar, sweet gum, tulip tree, and tupelo grow best in acid soils, pH 5.0 to 6.5, and will not tolerate alkaline soils. A few trees, for example bur and shingle oak, grow best in acid soils, pH 5.5 and below.

You may want to select trees suited to your soil condition, or modify the soil to suit the trees. Excessive acidity can be corrected by adding lime to the soil and alkalinity can be corrected by adding sulfur to the soil. The pH of the soil is determined by soil analysis.

2. WHAT FACTORS SHOULD I CONSIDER WHEN BUYING TREES?

Among the things to consider when buying one or more trees are the size to buy and the cost per tree.

Size to buy

The size of tree to buy will vary with the species, the effects desired from the new tree, the availability of the size desired, the number of trees to be purchased, and the amount of money you have to invest in plant material. Trees up to about 8 feet tall are often sold by an established price per foot of height. Larger trees may be sold by the trunk diameter in inches, measured 1 foot above the ground, or according to their overall size, shape, and appearance. Trees up to 8 or 10 feet tall usually require less pruning and recover more rapidly after transplanting than do larger trees. More rapid recovery results in more rapid growth, and a small tree may develop into a taller tree in 8 or 10 years than one that was larger at planting time. Less pruning also means less disfiguration and better balanced and shaped trees in years to come. On large trees that require more severe pruning, it is likely that the pruned branch tips will die and numerous sprouts will appear near the cut ends of the branches. Frequently these sprouts give rise to weak, deformed growth that disfigures the tree.

A common practice is to dig large trees, stockpile them in groups on a well-drained site, and cover the balled roots with wood chips or other suitable mulch. Masses of fibrous roots are produced in the mulch. Trees treated in this manner usually recover and become established more rapidly than trees planted immediately after being dug.

Cost of trees

The cost of trees varies with the species and size. Slow-growing trees that require more years to reach a given size cost more to produce than do fast-growing trees and therefore are sold at higher prices. Small trees that can be moved with bare roots cost less than the same trees of larger size that must be moved with balls of soil.

3. WHAT TREES SHOULD I CONSIDER?

Arborvitae

In Illinois, arborvitae, or white cedar (Thuja occidentalis)* (Fig. 11) is native to only a few counties in the northeastern part of the state. However, it is grown throughout the state for ornamental purposes. Also, it is used extensively in hedge plantings for screening and windbreaks. It will thrive in wet, neutral or alkaline soil, and in partial shade. During severe winters it is subject to injury, especially in the northern part of the state. In some years, it is severely defoliated by bagworms, and such defoliated trees usually die. Also, it is a host of the spruce spider mite.

Arborvitae is a small tree, reaching a height of 30 to 60 feet, with a straight or divided trunk. The short branches bend upward to form a narrow, compact, conical head. The leading branches have long-pointed

*This and all other scientific names, which would normally be italicized, are set in parenthesis due to the nature of the printing process used.

Fig. 11. Arborvitae is a small evergreen tree used for screening and ornamental purposes. Inset shows tip of a lateral branch with flattened 1/8-inch long leaves on several twigs.

leaves about 1/4 inch long while the lateral branches have sharp-pointed, flattened leaves about 1/8 inch long (Fig. 11 inset). Small, solitary, yellowish male and pinkish-green female cones are produced on the tips of short lateral branches. The mature seed-bearing cones, 1/3 to 1/2 inch long and oblong, open in autumn of the first year. The mature bark is red tinted and is broken into narrow ridges by shallow fissures. The brown tinted, yellow wood is aromatic. Although it is light in weight, soft, and brittle, its grain is straight and coarse and it is durable. It is used for railroad ties, poles, posts, shingles, and canoes.

Ash

In ornamental plantings, ash (Fig. 12) is used in parks, parkways, and occasionally along streets. It may also be used as a specimen tree. White (Fraxinus americana), black (F. nigra), red (F. pennsylvanica), and blue (F. quadrangulata) ash are native to Illinois. The introduced European ash (F. excelsior) has ornamental value. Black ash grows best in low, wet areas. Blue ash thrives on dry hills and grows as a tall tree with a narrow

Fig. 12. Ash is a rapid-growing tree with broad, spreading branches. The foliage turns yellow to deep purple in autumn. The compound leaves (inset) are composed of 5 to 11 leaflets.

crown. It is well adapted for lawn and street plantings. Of these five species, white ash and green ash (F. pennsylvanica var. subintegerrima), a variety of red ash, are grown throughout the state. These two tall, rapid-growing species are used extensively in street, lawn, and group plantings. As specimen trees, they usually develop round tops. Blue and green ash grow to a height of 60 feet, while white ash may reach a height of 80 feet.

The 8- to 12-inch-long, thin, compound, opposite leaves (Fig. 12 inset) of these five ash species are composed of 5 to 11 egg-shaped to elongate leaflets. They measure 3 to 6 inches long and vary in color from light yellow-green to dark green according to species. The leaves turn yellow to deep purple in autumn. On white and green ash, the inconspicuous male and female flowers are produced on separate trees. The paddle-shaped, winged seeds are produced in clusters. The bark is thick, dark brown, and deeply fissured with rounded, scaly ridges on white ash; red tinted to brown and slightly furrowed and scaly on green ash; and thin, light gray, and broken into large plates on blue ash. The hard, close-grained wood of some ash species, especially white ash, is tough and strong, and it is used for tool handles, oars, and sporting and athletic goods.

Ash is subject to attack by some insects and diseases. It is occasionally attacked by the fall webworm and green ash is especially subject to injury from oystershell scale. Also trees weakened from growing under adverse conditions may be killed by borers. In

recent years many ash trees have died from what seems to be a disease of unknown origin. Affected trees show gradual dying back of branches followed by death of the trees in several years.

Bald cypress

This tree (Taxodium distichum) (Fig. 13) grows tall and straight, reaching a height of 150 feet. Although it is a native tree in the swampy river bottoms of extreme southern Illinois, it will grow throughout the state and in many soil types. It grows rapidly and is useful for ornamental purposes. It is resistant to injury by ice and wind.

Fig. 13. Bald cypress is a rapid-growing tree. The twin trees in this picture are about 90 feet tall. The needlelike leaves are produced on two sides of small, featherlike branchlets (inset).

The leaves (Fig. 13 inset) measure 1/4 to 3/4 inch long and are produced in a featherlike fashion on two sides of the small branchlets. These branchlets with the leaves still attached drop off in autumn. The long, drooping clusters of male flowers and the globe-shaped, green, scaly, female flowers are borne separately on the same branch, the female flowers at the end of the branch. The fruit is a small, globe-shaped, woody cone which consists of thick, irregular scales, measures about 1 inch in diameter, and contains heavy, angled seeds. The 1- to 2-inch-thick, cinnamon-red bark is divided into broad, flat ridges by narrow fissures. The straight trunk has long, slender branches which give young trees a narrow, pyramidal shape. However, old trees usually have very broad, low crowns. In swampy sites the roots send up woody growths called "cypress knees" which are conspicuous above the water. Cypress lumber is durable and is used for many purposes.

Beech

American beech (Fagus grandifolia) (Fig. 14) is limited in its distribution to 17 counties in the southern and southeastern sections of Illinois and to Lake County in the northeastern corner of the state. It is a native forest tree which grows best in deep, rich soil, and it does not lend itself readily to cultivation. As a specimen tree it has a round head with wide-spreading branches and may reach a height of 80 feet.

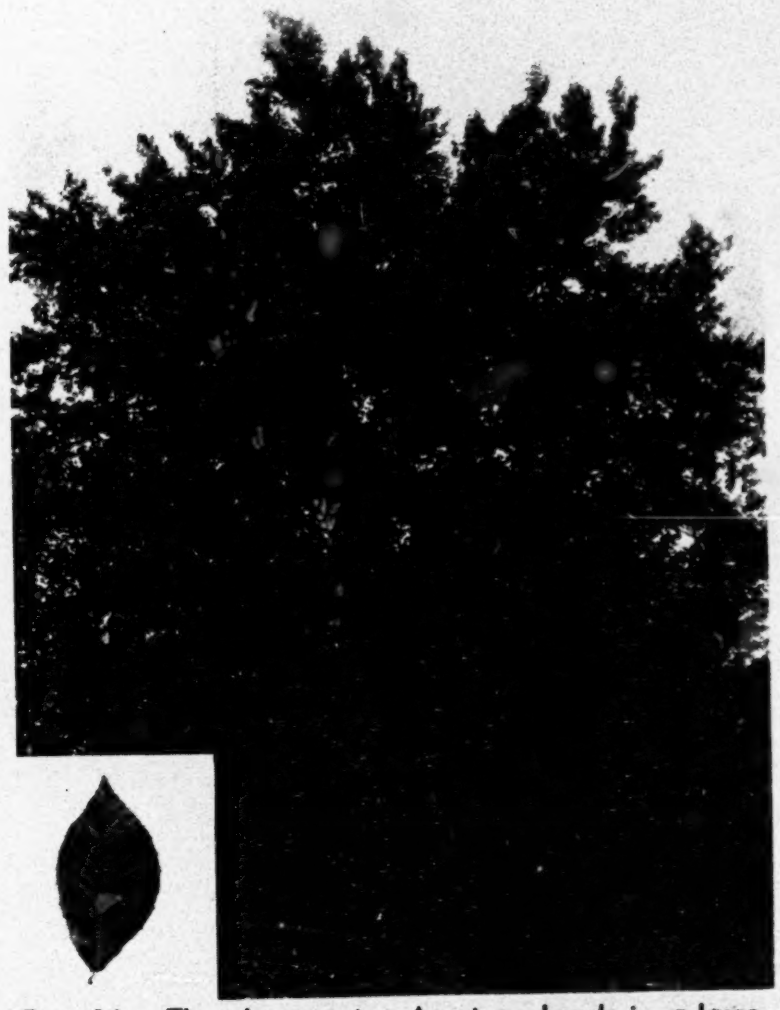

Fig. 14. The slow-growing American beech is a large tree with conspicuous light gray, smooth bark. The leaves are egg-shaped to somewhat oblong, thin, and leathery (inset).

The egg-shaped to somewhat oblong, thick, firm, sharp-pointed, alternate leaves (Fig. 14 inset), 2 1/2 to 5 inches long, are sharply and coarsely toothed, dull green above and pale green and shiny beneath. The yellowish-green, drooping, globe-shaped clusters of male flowers, and the female flowers in pairs surrounded by numerous pointed scales, are produced separately on the same tree. Each fruit is a 3/4-inch, short-stalked, prickly bur which splits into four parts to liberate two small, shiny, brown, three-sided, sweet, edible nuts. The thin, smooth, light blue-gray bark is often mottled with dark spots. Beech is a slow-growing tree that is difficult to transplant.

The ornamental forms of the introduced European beech (F. sylvatica) will grow under more variable environmental conditions. The purple or copper form (Fig. 15) is prized for its foliage color and for its silhouette in winter. The columnar form (Fig. 16) is used for accent purposes. It has no objectionable flowers or seeds, and its foliage is light yellow in autumn.

Fig. 15. The leaves (inset) of purple or copper beech are purple in the spring and summer and later become copper colored.

Beech is relatively free of diseases and insect pests. Occasionally it is injured by application of fertilizer. To prevent such injury, apply only half of the amount of fertilizer commonly recommended for trees.

The hard, close-grained wood of the American beech, with light to dark red heartwood and nearly white, thin sapwood, is strong and tough. However, it is hard to season, and it is not durable in the ground. It takes a high polish and it is used extensively for furniture, tool handles, veneer, and fuel. The slight, silver grain on the radial surface makes it distinctive when used for flooring and stairways.

Fig. 16. The columnar form of beech, with its lustrous leaves (inset), is used for accent purposes in landscaping.

Birch

Six species of these trees, European (Betula pendula), cherry (B. lenta), yellow (B. lutea), river (B. nigra), canoe (B. papyrifera), and gray (B. populifolia) birch, are hardy in Illinois. Birch is used for specimen, park, and lawn plantings, and grows well in moist, rich soil.

The smooth and sometimes papery bark of young birch trees is distinctive and is white in some species. The pointed, irregularly toothed, alternate leaves, 1 1/2 to 6 inches long, vary from egg shaped on cherry, yellow, river, and canoe birch to triangular on European (Fig. 17 inset) and gray birch. They are dark green above and lighter beneath. The leaves of most birch trees turn yellow in autumn. The male and female flowers are produced on separate and conspicuous catkins on the same tree. The brown male catkins start forming in autumn while the green fe-

male catkins do not form until spring. The erect, conelike fruit, 3/4 to 1 1/2 inches long, contains oval nutlets which appear rounded because of lateral wings.

Some birches are relatively small trees, growing to a height of 30 to 50 feet (European birch), while other birches reach a height of 60 to 70 feet (cherry birch). Also, the birches with pendulous branches are graceful in appearance (Fig. 17). Birch trees are attractive to birds

Fig. 17. The weeping form of European birch is prized for its white, papery bark, pendulous branches, and deeply cut leaves (inset).

Birches growing on dry sites and in soil low in fertility are frequently attacked by the bronze birch borer. Extensive borer damage results in death of infested trees. Also, such weakened trees are susceptible to Melanconium canker, a fungus disease. In wet seasons the leaves may be affected by such fungus diseases as powdery mildew and leaf spot. The hard, close-grained wood of birch, is strong and is used for agricultural implements, furniture, dowels, toothpicks, and numerous other articles, especially novelties. The wood of cherry and yellow birch is heavy while the wood of river, canoe, and gray birch is light.

Buckeye

The Ohio buckeye (Aesculus glabra) (Fig. 18) is a native tree which grows along streams

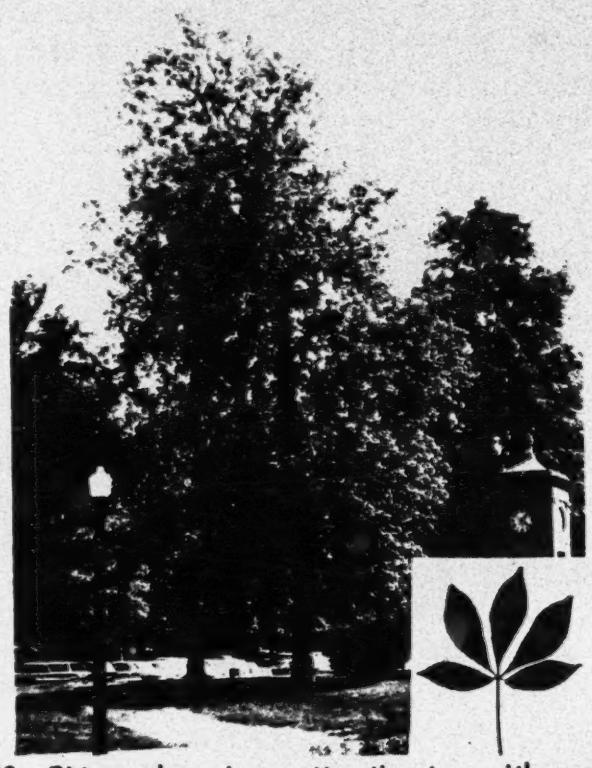

Fig. 18. Ohio buckeye is an attractive tree with compound leaves made up of five long leaflets (inset). Its use is limited in ornamental plantings because the leaves are frequently damaged by leaf blotch.

and in ravines in the woodlands of Illinois. Occasionally, it is used as a specimen tree in ornamental plantings. It is a small tree, reaching a height of 30 to 40 feet, with a long, round-topped crown.

Each large, opposite, compound leaf (Fig. 18 inset) consists of five long leaflets which are oval in shape, pointed, and with toothed margins. The leaflets are yellow-green on top and paler with fine hairs on the main veins beneath. The large clusters of conspicuous, pale yellow-green, perfect flowers are produced shortly after the leaves are fully grown. The large, round, sharply warty, brown fruits contain from one to three shiny, brown or dark mahogany, smooth seeds which measure 1 inch or more in diameter. The trunk is covered by dark brown to gray, fissured, scaly bark.

Although buckeye is relatively free of insect pests, it is susceptible to leaf blotch, a fungus disease that causes the leaves to turn brown and fall prematurely and results in serious defoliation almost every year. However, this disease can be controlled by timely applications of a fungicide such as zineb or ziram. The poisonous nuts and bark should be kept away from cattle. The light wood, although close grained, is weak and soft.

Because of its whiteness it may be sold as basswood. It is used in the manufacture of woodenware of various kinds, drawing boards, and paper pulp.

Catalpa

Western (Catalpa speciosa) and common (C. bignonioides) catalpa (Indian bean) are planted occasionally as specimen trees because of their profuse, showy flowers. Also, catalpa will withstand crowded city and industrial conditions better than many other trees. However, the flowers cover the ground when they fall in the spring, and the long beans or fruits and the large leaves are a nuisance in the fall. Catalpa (Fig. 19) is a tree of moderate height but occasionally it may become exceptionally tall, reaching a height of 80 to 90 feet.

Fig. 19. Catalpa produces a profusion of white, showy flowers in the spring and long, slender beans in the fall. The leaves (inset) are large and heart shaped.

The heart-shaped leaves (Fig. 19 inset) are either opposite or three-whorled around the branch. The long-pointed leaves of western catalpa are 10 to 12 inches long and 7 to 8 inches wide, while the shorter leaves of common catalpa are 5 to 6 inches long and 4 to 5 inches wide. The light green leaves of common catalpa and the dark green leaves of western catalpa are smooth above and paler and hairy beneath. The perfect flowers are white with bright purple spots, about 2 inches long, and in open, 8-inch clusters. They are several-flowered on western catalpa and many-flowered on common catalpa. The long, slender, beanlike pods have thick walls on western catalpa and thin walls on common catalpa. They measure 8 to 20 inches long and about 1/2 inch wide. They contain several light brown seeds, each with fringed wings. The light, grayish-brown bark of catalpa becomes furrowed and rough with age.

Western catalpa, native in the southern half of Illinois, is suited for background plantings in large gardens. It is relatively resistant to injury by ice and wind. Umbrella catalpa, a variety of common catalpa which grows 6 to 15 feet tall, has an umbrella-like crown. Catalpa trees are frequently attacked and defoliated by the catalpa sphinx. Occasionally they are affected by powdery mildew and leaf spots, but usually very little noticeable injury results. They are more subject to damage caused by Verticillium wilt, a fungus disease. The light brown, coarse-grained wood of catalpa is light and soft. It is used mostly for rough work and occasionally for furniture and the interiors of houses. Catalpa for fence posts has been greatly overrated.

Cherry

Chokecherry (Prunus virginiana) and wild black cherry (P. serotina) are native to Illinois. Chokecherry occurs in the northern half and wild black cherry occurs throughout the state. Chokecherry is a small tree which grows 20 to 30 feet high.

Wild black cherry (Fig. 20) sometimes

Fig. 20. Wild black cherry, with its sharply toothed, leathery leaves (inset), is suitable as an occasional tree in street and lawn plantings.

reaches a height of 80 to 90 feet. It has a narrow crown with small, horizontal branches, and is suitable for street and lawn plantings. The alternate, sharply toothed, dark green, firm leaves (Fig. 20 inset), 2 to 6 inches long and slightly over an inch wide, are shiny above and dull beneath. The perfect, white flowers are produced in 4- to 6-inch-long clusters. The hard, pitted cherries, which measure about one-third inch in diameter, are dark red to almost black when ripe. The dark red-brown to almost black bark is thin and smooth, and has horizontal, slitlike, corky areas at first, but breaks into rough, scaly plates with age.

Cherry trees are seldom seriously damaged by diseases or insect pests. However, hydrocyanic acid (HCN) forms in wilting leaves and is poisonous to livestock. The light, hard, strong, close-grained, light brown wood of wild black cherry is excellent for making fine cabinet articles and for interior finish work of houses. The wood of chokecherry is of little commercial value.

Chestnut

Of the three native chestnuts in the United States, only American chestnut (Castanea dentata) is native to Illinois. American chestnut (Fig. 21), a broad, round-topped, bulky tree that reaches a height of 60 feet, is grown to a limited extent in orchards. It prefers an acid soil.

The 6- to 8-inch, thin, oblong, lance-shaped alternate leaves (Fig. 21 inset) are sharply pointed, coarsely and very sharply toothed, dark green above, and pale yellow beneath. The white flowers are borne on two kinds of catkins on the same tree and appear in late June or July. One kind is erect, stalked, 6 to 8 inches long, and bears male flowers. The other kind bears two to five perfect flowers in clusters near the bases of slender, hairy catkins, 2 1/2 to 5 inches long. The large, globular, brown bur is densely covered with long, branched, sharp spines. It splits open into four parts to expose from one to three sweet, reddish- to lustrous-brown, edible nuts, each 3/4 to 1 inch long and having a sharp, hairy tip. The grayish-brown bark is divided by shallow fissures into broad, flat ridges which often are arranged spirally around the trunk.

Fig. 21. American chestnut, with its sharply toothed, oblong, lance-shaped leaves (inset), has practically disappeared from the American landscape because of the scourge of chestnut blight.

Because of chestnut blight, a fungus disease, American and Spanish (C. sativa) chestnuts are not recommended for ornamental plantings. Japanese (C. crenata) and Chinese (C. mollissima) chestnuts are resistant to chestnut blight and are used occasionally in lawn, park, and street plantings. However, the Asiatic chestnuts are susceptible to oak wilt, which is serious and widespread in Illinois. The light, soft, coarse-grained wood of American chestnut is durable in the soil and is suitable for fence posts, poles, and railroad ties. It is useful, also, for interior finishing of houses and is highly prized by some for making furniture.

Coffee tree

Kentucky coffee tree (Gymnocladus dioicus), sometimes called coffeenut or mahogany, is found mostly in rich bottomlands in Illinois. It is hardy in Illinois and may be used occasionally as a specimen tree (Fig. 22) on wide lawns. It grows vigorously, reaching a height of 80 to 90 feet, with 3 to 4 upright main stems which form a narrow, round-topped crown. The stubby branches give the tree a distinctive winter silhouette and make it relatively resistant to damage caused by ice and wind.

The large, alternate, doubly compound leaves (Fig. 22 inset), 2 to 3 feet long, have numerous smooth, dark green, egg-shaped leaflets 2 to 2 1/2 inches long and 1 inch wide. The greenish-white male and female flowers are produced separately on the same tree. The male flowers are in clusters 3 to 4 inches

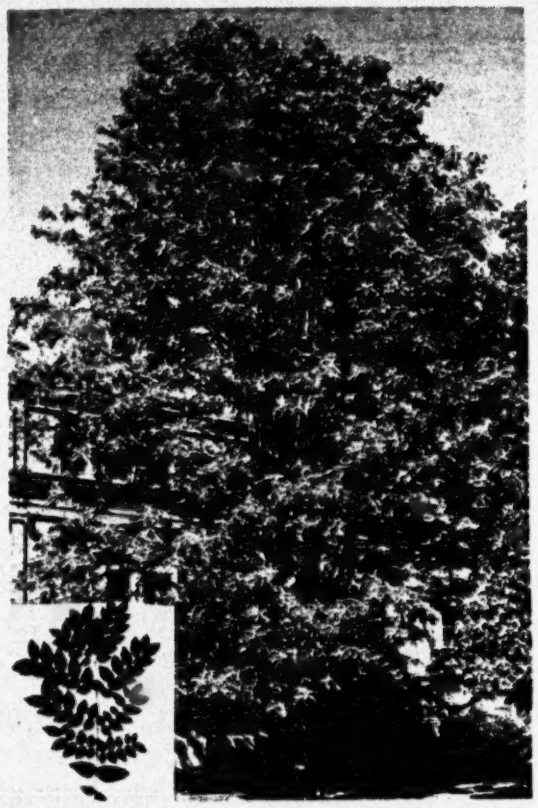

Fig. 22. The fast-growing Kentucky coffee tree, with its doubly compound leaves (inset), has conspicuous bark that is very rough and scaly.

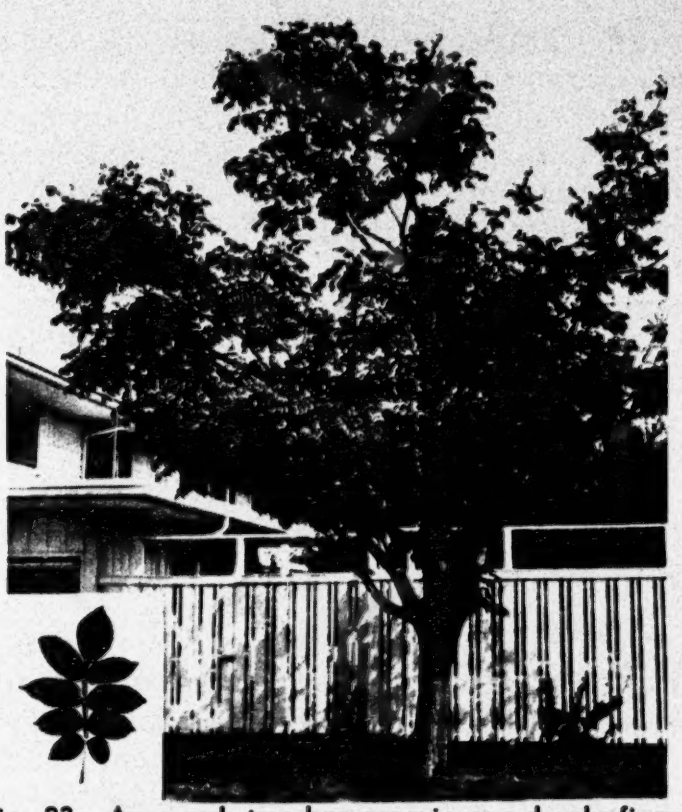

Fig. 23. Amur cork tree has conspicuous deeply fissured bark that appears corky. The compound leaves (inset) are unusual because of the wing- or flange-like appearance of the midribs.

long and the female flowers are in clusters 10 to 12 inches long. The hard-shelled, dark brown seeds are produced in brown, thick, flat, bulky pods 3 to 6 inches long and 1 to 2 inches wide which remain on the tree over winter. The seeds remain viable for several years in the soil. The red-tinted, dark gray bark is curiously ridged with thin, scaly flakes attached at the sides.

Kentucky coffee tree is unusually free of diseases and insect pests. The coarse-grained, heavy wood is strong and durable, but it is not very hard. It has very little commercial value, although it is used to some extent for fence posts and rough timbers, and occasionally in cabinet making.

Cork tree

Amur cork tree (Phellodendron amurense), introduced into the United States from eastern Asia about 1856, is a low-growing tree with wide-spreading branches and aromatic wood (Fig. 23). It is called cork tree because of the corky appearance of its deeply fissured, light gray bark. It grows to a height of 40 to 50 feet with a branch spread of 30 feet. It is drought resistant and is recommended for ornamental plantings in the northern two-thirds of Illinois.

The opposite, compound leaves (Fig. 23 inset) are composed of 5 to 13 egg-shaped to elongate, finely toothed, sharp-pointed, 2- to 4-inch-long leaflets which are dark green above and paler beneath. The leaflets are attached to a winged midrib. The leaves turn yellow in autumn. The small, yellowish-green, inconspicuous flowers appear in June and are produced in terminal clusters 2 to 8 inches high. Male and female flowers are produced on separate trees. The black fruit, up to 1/2 inch in diameter, has a strong turpentine-like odor when bruised and contains five small, one-seeded stones. It ripens in September and October. Amur cork tree is tolerant of city conditions and is relatively free of diseases and insect pests. The wood is very soft and subject to storm damage.

Crabapple

The native crabapple (Malus ioensis) (Fig. 24) is a small, spiny tree that grows throughout the state and produces flowers in the spring. The alternate, egg-shaped to oblong, sharply toothed or sometimes shallowly lobed, firm leaves (Fig. 24 inset) are shiny and dark green above and pale yellow and somewhat hairy beneath. They measure 2 1/2 to 4 inches long and 1 to 1 1/2 inches wide. The perfect flowers with their pink to rosy

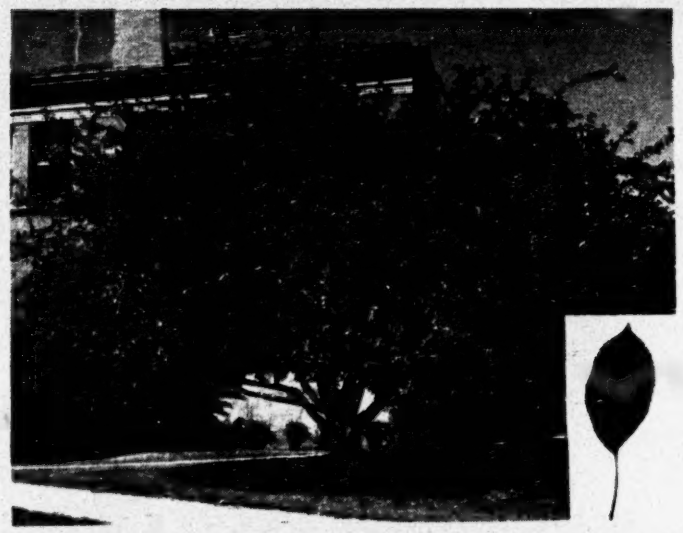

Fig. 24. The small, low-growing crabapple is used extensively in ornamental plantings. The various species and horticultural varieties have flowers ranging from white through pink to red. Inset shows a sharply toothed leaf.

petals are 1 to 2 inches broad and borne in clusters of three to six. The green to greenish-yellow, globe-shaped fruit is 3/4 to 1 1/2 inches in diameter. The thin bark is scaly and red to brown.

A variety of this crabapple, Bechtal crab (M. ioensis plena), is widely used as a decorative tree because of the showy appearance of its large, double, rosy-pink blossoms. Several introduced and naturalized species and horticultural varieties, especially of Asiatic origin, are grown for their decorative value. They have flowers ranging from white through pink to red, and fruits ranging from yellow through orange and red to purple. Some varieties have red to purple foliage.

Crabapples are small trees with a branch spread of 20 to 30 feet and reach a height of 20 to 30 feet. They are useful for specimen trees and border plantings, and are suitable for plantings around one-story buildings. They are relatively resistant to injury from ice and wind. Asiatic species are relatively free from attack by diseases and insect pests, and are preferred for ornamental purposes because the native crabapples may be severely damaged by several diseases and insect pests. The more destructive diseases are the rusts, fire blight, and scab. Insects which may severely damage crabapples include the yellow-necked caterpillar, hawthorn leaf miner, wooly hawthorn aphid, and San Jose scale. European red mites frequently damage crabapples. The wood of crabapples is of little commercial value.

Dogwood

Of the several species of dogwood native to the United States, only four attain tree size and only two of these are common in Illinois—flowering dogwood (Cornus florida) and alternate-leaved or pagoda dogwood (C. alternifolia). The introduced cornelian cherry (C. mas) and flowering dogwood are recommended for landscape purposes. These dogwoods grow to a height of 20 to 25 feet, with a branch spread of 15 to 25 feet. They grow best in rich soil.

In Illinois, flowering dogwood is common in the woodlands south of a line through Hancock, Mason, Piatt, Champaign, and Vermilion counties. Alternate-leaved dogwood occurs in the northern part of the state, extending southward into Vermilion and Champaign counties. South of this area, it is recorded from Adams, Pike, Calhoun, Coles, Clark, Jackson, Union, Alexander, and Pope counties. In woodlands, dogwood grows as an understory tree or as a shrub.

Flowering dogwood (Fig. 25), which prefers an acid soil, is the most widely grown dogwood and it is valued especially because of its showy, early-spring flowers. It produces a low-spreading head of horizontal, tiered branches. The opposite, oval, minutely hairy, firm leaves (Fig. 25 inset) are bright green above and pale green beneath. They are 3 to 6 inches long and 1 to 2 inches wide. The fragrant, nectar-producing, small, greenish-white or yellow, perfect flowers

Fig. 25. Flowering dogwood is a small tree valued for its showy, early-spring flowers. The oval-shaped firm leaves (inset) are bright green above and pale green beneath.

open before the leaves appear. They develop in dense, flat-topped heads which are surrounded by four white or occasionally pinkish, flower-like cups. The entire structure is 3 to 4 inches across and appears as a single flower. The oval, bright red fruit, about 1/2 inch long and 1/4 inch wide, contains one or two pale brown seeds. The thin, reddish bark is broken by deep fissures into small, square blocks, giving an effect similar to that of alligator hide.

The alternate-leaved dogwood differs from most dogwoods because of its alternate leaves. The leaves are similar in size but more slender than the leaves of flowering dogwood. The small, creamy-white flowers appear in May and June as loose, branched heads on the tips of lateral branches. The dark blue, globular fruits ripen in October. They are nearly 1/2 inch in diameter and are produced in loose, spreading, reddish-stemmed clusters. The reddish-brown bark is smooth, or shallowly fissured, and rigid.

The cornelian cherry, one of the earliest flowering trees, has its branches wreathed with 3/4-inch-long clusters of tiny yellow flowers which appear before the leaves. The opposite, egg-shaped, sharp-tipped leaves, 1 1/2 to 4 inches long, are lustrous above with short, downy hair beneath. The oblong, scarlet, 3/4-inch-long, edible fruit, which ripens in August, is hidden by the leaves. The dark brown bark becomes rough with age. The flaking of small patches exposes a gray undersurface.

Flowering dogwood is subject to a destructive fungus disease called crown canker which occurs in the eastern part of the United States but which has not been reported in Illinois. The hard, brown, close-grained wood is used to some extent in industry.

Ginkgo

Ginkgo, sometimes called maidenhair or Kew tree (Ginkgo biloba), is a tall, hardy, slow-growing naturalized tree (Fig. 26) with a straight trunk and few branches. It reaches a height of 80 to 90 feet with a branch spread of 30 to 50 feet. It tolerates various types of soil but prefers an acid soil, withstands dry weather and heat, persists under city conditions, and is resistant to injury from ice and wind. It is used extensively in ornamental plantings, especially as a street or specimen tree.

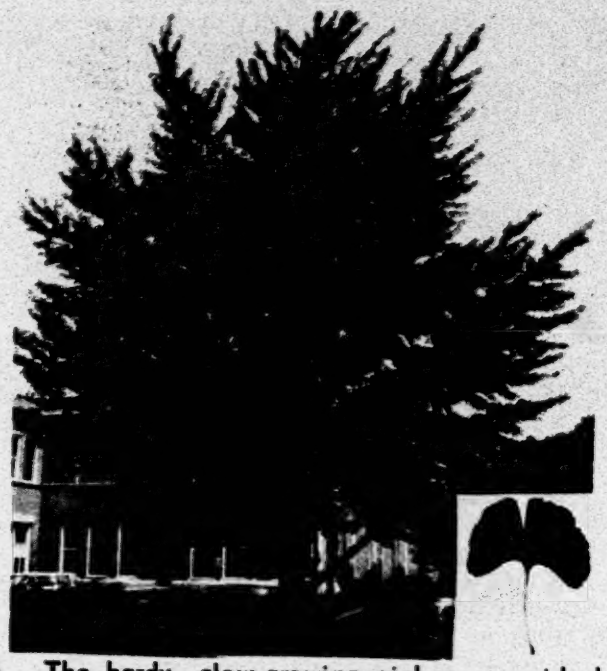

Fig. 26. The hardy, slow-growing ginkgo or maidenhair tree has relatively few but sturdy branches and oddly fan-shaped, leather leaves (inset).

The alternate, long-stalked, oddly fan-shaped leaves (Fig. 26 inset) are bright to dull green, firm, often two-lobed, and are 1 to 2 inches long, 1 1/2 to 3 inches across, and form in clusters of three to five on short spurs. They turn yellow to gold in the fall. The male and female flowers are borne on separate trees, the male flowers in loose catkins. The yellowish, oval, ill-smelling fruit is 1 inch in diameter and contains an angular, creamy-white, thin-shelled nut. In the nut is a sweet, edible kernel. To avoid the disagreeable odor of the fruit, only male trees should be planted. The gray, rough bark is deeply fissured, distinctive, and picturesque. Ginkgo is exceptionally free of diseases and insect pests.

Goldenrain tree

Goldenrain tree (Koelreuteria paniculata), also called varnish tree, China tree, and pride-of-India, was introduced into the United States from eastern Asia in 1763. This low, wide-spreading, round-headed tree (Fig. 27), with sparingly contorted branches and a crooked trunk, reaches a height of 30 feet and has a branch spread of 30 to 40 feet. It is recommended for ornamental plantings in the southern two-thirds of the state. This drought-resistant tree prefers an alkaline soil but grows satisfactorily in most soils. It grows best in sunny locations.

Fig. 27. Goldenrain tree, with its large, many-leafleted, compound leaves (inset), produces long clusters of bright yellow flowers in the spring and bladder-like pods of fruit in the fall.

The 6- to 14-inch-long, alternate, compound leaves (Fig. 27 inset) are composed of 5 to 15 round-toothed, egg-shaped to somewhat oblong leaflets 1 to 3 inches long, dark green and smooth above, and paler beneath. Some leaflets are variously lobed. The broad, loose, 8- to 14-inch-long clusters of bright yellow, perfect flowers are produced in profusion during July and August. Flowers of only one sex are produced on some trees. The 1 1/2- to 2-inch-long, papery-walled, bladder-like pod of fruit contains two black seeds. It changes from light to dark brown as it matures. This tree is relatively free of diseases and insect pests, but is subject to winter injury which frequently develops as frost cracks of the trunk or winter killing of twigs. Recently, it has been reported susceptible to Verticillium wilt.

Hackberry

Hackberry or sugarberry (Celtis occidentalis) (Fig. 28) and Mississippi hackberry, also called sugarberry (C. laevigata), are native to Illinois. Hackberry is fairly common on rock hills and ridges, and occurs occasionally on low ground. It grows throughout the state and reaches a height of 90 feet with branches spreading to 50 feet. Mississippi hackberry grows mostly on bottomlands in the southern third of the state. Hackberry is relatively tolerant of city conditions, and both

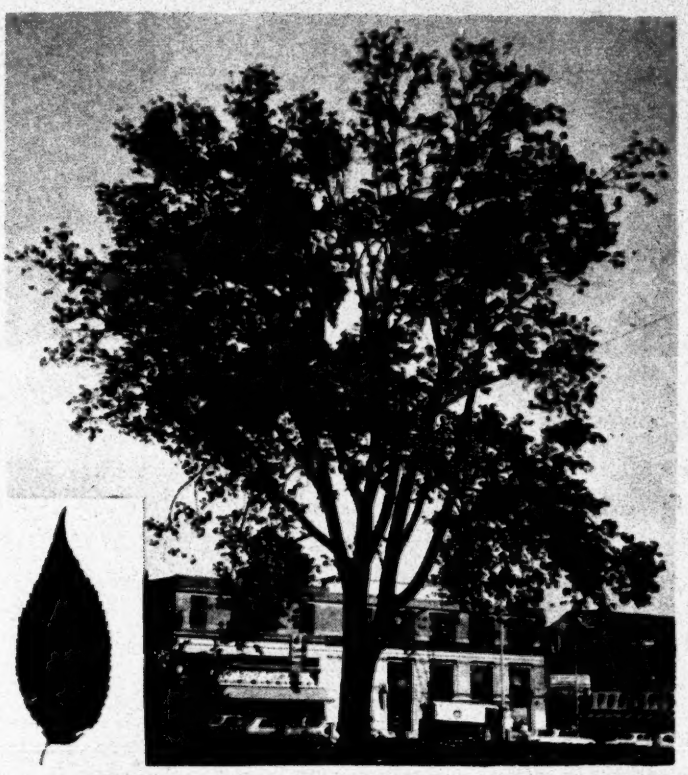

Fig. 28. Hackberry is relatively free of diseases and insect pests except for witches'-broom. The leaves (inset) are somewhat similar in size and shape to leaves of American elm but are lighter green in color.

species are used for shade and ornamental purposes.

The long, thin, sharply pointed, light green, alternate leaves (Fig. 28 inset) are 2 to 5 inches long and 1 1/2 to 2 inches wide. The margins are sharply toothed on hackberry and smooth on Mississippi hackberry. The small, cream-colored to greenish flowers are inconspicuous, and male and female flowers are borne separately on the same tree, the female flowers singly and the male flowers in small clusters. The small, round, berry-like fruit measures 1/4 to 1/3 inch in diameter. It is orange-red to yellow on Mississippi hackberry and orange-red, turning to dark purple, on hackberry. The bark of hackberry is dark brown and broken up into corky ridges, while the bark of Mississippi hackberry is pale gray and covered with corky warts. Hackberry wood is used mainly for posts and cheap furniture.

Hackberry is relatively free of diseases and insect pests except for witches'-broom. The formation of witches'-broom is associated with a powdery mildew fungus and a gall mite. The broomlike growths are composed of clusters of dwarfed shoots that grow from swollen or enlarged areas on branches. They

are more conspicuous during the winter when the trees are without leaves. No effective cure is known for this trouble. When objectionable, the brooms may be removed by pruning. American hackberry is more susceptible to witches'-broom than Mississippi hackberry.

Hawthorn

Hawthorns, as illustrated in Fig. 29 (Washington thorn), are very hardy, small trees. Some hawthorns are used extensively in ornamental plantings because of their showy white, pink, or red flowers and attractive red fruit. The alternate, simple leaves (Fig. 29 inset) are generally toothed and often more

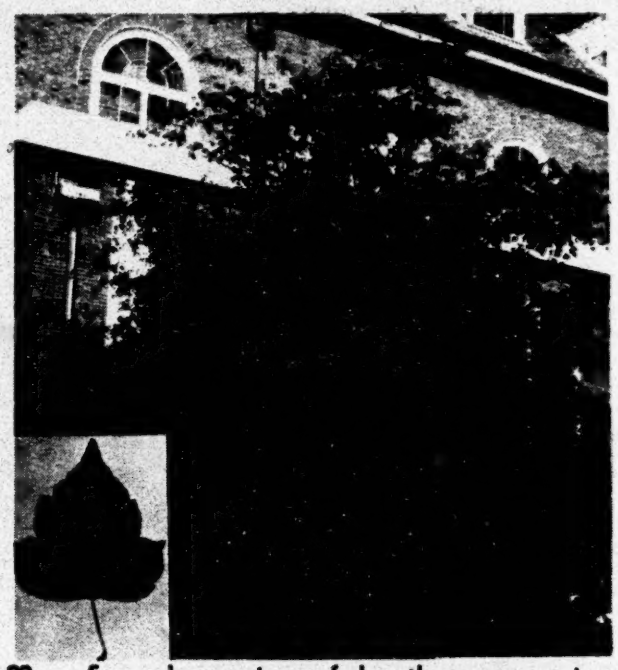

Fig. 29. Several species of hawthorn are prized as ornamental trees, but in some years they are severely defoliated by the cedar rusts, and individual plants may be damaged or killed by fire blight. Inset shows a toothed and lobed leaf of Washington thorn.

or less lobed. They vary on different species from yellowish-green to dark green and shiny. The perfect flowers are produced in small to large groups on the ends of short, leafy, side branches. The round to oblong, dry, mealy fleshed fruit is bright or orange-red in color and is called a "haw." It contains one to five hard, bony-shelled nutlets. Each nutlet contains a single brown seed.

Hawthorns are shrubby-looking trees with spiny, stout, coarse, ascending or spreading branches and broad, open heads. The short trunks are covered with dark, scaly bark. Although over 100 species have been recorded for Illinois, only a very few are well known. Red haw (Crataegus mollis), one of the larger hawthorns, is common in many woodlands in the state. Washington thorn (C. phaenopyrum), cockspur thorn (C. crus-galli), and English hawthorn (C. monogyna) represent the more common hawthorns grown for ornamental purposes. They are excellent for landscaping around one-story buildings. They grow to a height of 15 to 40 feet with a branch spread of 15 to 25 feet. However, they may be severely damaged by fire blight or by cedar rusts. They are seldom injured by ice and wind. The hard wood of hawthorn is tough and is used for tool handles, fishing rods, mallets, and other small articles.

Honey locust

Honey locust (Gleditsia triacanthos), which prefers an alkaline soil, is widespread in the state, while water locust (G. aquatica) grows only on the swampy bottomlands of the Mississippi, Cache, Ohio, and Wabash rivers in southern Illinois. The typical forms of both species are very thorny and unsuited for ornamental purposes. The thornless form (Fig. 30) of honey locust (G. triacanthos forma inermis) grows satisfactorily in various types of soil and is used widely in street and lawn plant-

Fig. 30. Thornless honey locust has been used extensively where elms have been killed by disease. Its compound leaves (left inset), composed of 18 to 28 small leaflets, produce light shade. Some leaves are doubly compound (right inset) and composed of 8 to 14 singly compound leaves.

ings. It grows rapidly, and may reach a height of 70 to 80 feet, with a branch spread of 60 to 70 feet.

The large, alternate, compound leaves (Fig. 30 left inset), 7 to 10 inches long, are composed of 18 to 28 small, shiny, dark green leaflets which are about 1 inch long and 1/4 inch wide. Some leaves are doubly compound (Fig. 30, right inset) and composed of 8 to 14 singly compound leaves. The inconspicuous, yellowish-green flowers appear in June when the leaves are nearly full grown and are attractive to bees. The male flowers are short, many-flowered, pubescent clusters. The female flowers are slender, single- to few-flowered clusters. Male and female flowers are borne on the same tree. The dark, reddish-brown fruit develops as a flattened, twisted pod 10 to 18 inches long and 1 to 1 1/2 inches wide. Each pod contains several hard, oval seeds embedded in sweet, yellow pulp. Selections of the thornless honey locust which grow very rapidly and do not produce seeds are available. The 1/2- to 3/4-inch-thick bark is divided into long, longitudinal ridges by deep fissures and the surface is roughened by small persistent scales.

Thornless honey locust is relatively free of diseases. However, the foliage may be seriously damaged by bagworm, pod gall, mimosa webworm, and locust mite. The hard, strong, reddish-brown, coarse-grained wood of the honey locust is very durable in contact with the soil. It is used extensively for fence posts and railroad ties and to a limited extent as lumber.

Hop hornbeam

Hop hornbeam or ironwood (Ostrya virginiana) (Fig. 31) is a small, native, slow-growing tree that reaches a height of 25 to 30 feet with a branch spread of 20 to 30 feet. Mature trees usually develop open, round-topped crowns of slender branches. It occurs throughout Illinois and grows on high banks of streams where it tolerates the shade of oaks and other tall trees. It prefers an acid soil, does not thrive in open, sunny places, and is difficult to transplant.

The smooth, thin, firm, alternate, elm-like leaves (Fig. 31 inset) are 3 to 5 inches long and 1 1/2 to 2 inches wide with finely double-toothed margins. Male and female

Fig. 31. The small, slow-growing hop hornbeam, with its elmlike leaves (inset) and hop-like fruit, is suitable as an occasional tree in ornamental plantings.

flowers are borne separately on the same tree. The 2-inch-long male flowers form as clusters of reddish-brown catkins from lateral buds near the end of the previous year's twig growth. The pale green, 1/2- to 3/4-inch long female flowers form as erect spikes or short catkins at the tip of the new growth. The long-stalked, pendulous, hoplike fruit is made up of a number of bladdery sacs with hairs at the base of the papery scale. Each sac encloses a chestnut-brown, pointed, flattened nutlet. The gray to brown, shredded bark appears as narrow, scaly plates which are loose and curled at the free end.

Hop hornbeam is relatively free of destructive diseases and insect pests. The hard, close-grained wood is not durable in the soil. However, because of its strong and tough characteristics, it is used for mallets and handles of various tools.

Hornbeam

Hornbeam or blue beech (Carpinus caroliniana) (Fig. 32) is a small, slow-growing, bushy tree, with slender, slightly zig-zag, spreading, droop-tipped branches, that reaches a height of 35 feet with a branch spread of 15 to 20 feet. It thrives in partial shade along streams as an understory tree and is used occasionally in ornamental plantings.

The alternate, thin, long-pointed leaves (Fig. 32 inset), with double-toothed margins,

Fig. 32. Hornbeam, with its pointed leaves (inset) is used occasionally in ornamental plantings. It is sometimes called blue beech because its smooth, gray bark resembles the bark of beech.

are green and smooth above, and light yellow and smooth to finely hairy beneath. They are 2 to 4 inches long and 1 1/2 to 2 inches wide. The male and female flowers form as separate catkins on the same tree after the leaves appear. The 1- to 2-inch-long male catkins have egg-shaped, pointed scales which are green below the middle and red above. The 1/2- to 3/4-inch-long, erect, female catkins have hairy, leaflike, green scales. The fruit is a nutlet borne at the base of a three-lobed, leaflike structure. Several of these structures are arranged spirally in a conelike cluster. The smooth, gray bark is occasionally marked with brownish horizontal bands.

No destructive diseases have been reported affecting hornbeam in Illinois. The hard, heavy, close-grained wood is strong and is used to a limited extent in industry.

Horse chestnut

Horse chestnut (Aesculus hippocastanum) is an introduced tree which is grown for shade, ornamental, and specimen purposes. It is a large tree (Fig. 33), growing to a height of 75 feet with a branch spread of 30 to 40 feet.

The large, compound, opposite leaves (Fig. 33 inset), dark green above, paler beneath, and turning rusty-yellow in the fall, have five to seven leaflets. Each abruptly pointed, irregularly toothed leaflet is wedge shaped and wider toward the tip. The large, 6- to 12-inch-high, showy, chandelier-like flower clusters are white, tinged with red, and appear shortly after the leaves unfold in the spring. They give rise to large, round, spiny fruits. Each fruit contains one or two large, shiny, brown nuts. The dark brown bark breaks up into slowly peeling, thin plates. The red horse chestnut (A. x carnea) has pink flowers. Many horse chestnuts in Illinois are attacked by a fungus disease called leaf blotch. Large areas of affected leaves are killed by this fungus. Severely affected trees show extensive browning of leaves and premature defoliation in late summer. The weak, soft, whitish wood of the horse chestnut has only limited use, mainly in the manufacture of woodenware.

Fig. 33. Horse chestnut produces showy clusters of red-tinged, white flowers in the spring. Its compound leaves (inset) are frequently killed in late summer by a fungus disease.

Juniper

Junipers are small, aromatic evergreen trees with slender branches and small needle- or scalelike leaves. Upright and low, spreading forms are used extensively in ornamental plantings, especially in border plantings and as specimen plants. Occasionally they may be used in windbreaks. Numerous varieties are available for these purposes. The native red cedar (Juniperus virginiana) (Fig. 34),

Fig. 34. Several species of juniper are small, aromatic evergreen trees suitable for border and specimen plantings. Inset shows a branch tip, with numerous small, needlelike leaves on the lateral shoots.

which grows throughout Illinois, reaches a height of 20 to 50 feet. It withstands cold weather, hot and dry weather, and wind and ice storms. It is also tolerant of wet soils. It frequently takes over abandoned fields of barren soil, and it thrives in fence rows where fruits have been dropped by birds.

The sharp-pointed 1/4- to 3/4-inch-long needle-like leaves develop on young growth or vigorous shoots and are whitened beneath on older shoots. The dark green, scalelike leaves (Fig. 34 inset), about 1/16 inch long, grow in such a manner that the stems appear square in cross section. Male and female flowers, produced at the ends of twigs, are borne on separate trees in early spring. The conelike male flowers with four to six scales contain an abundance of yellow pollen. The female flowers have violet-colored cone scales which become fleshy and grow together to form a blue, fleshy, globose, berry-like, few-seeded fruit 1/4 to 1/3 inch in diameter. The red-tinted, brown, thin bark peels off in long, narrow, shredlike strips.

Red cedar, Colorado juniper (J. scopulorum), and many forms of these two species are susceptible to the rust fungi which frequently damage hawthorn and crabapple. Two pests of junipers which cause severe defoliation in some seasons are bagworm and spruce spider mite. The fragrant, fine-grained wood of red cedar is relatively soft and brittle. However, it is exceedingly durable and is suitable for fence posts, piles, railroad ties, and other products which must be exposed to water, soil, or the weather.

Katsura tree

Katsura tree (Cercidiphyllum japonicum), introduced into the United States from Japan in 1865, is a pyramidal, 20- to 30-foot-tall tree (Fig. 35), usually with several trunks and

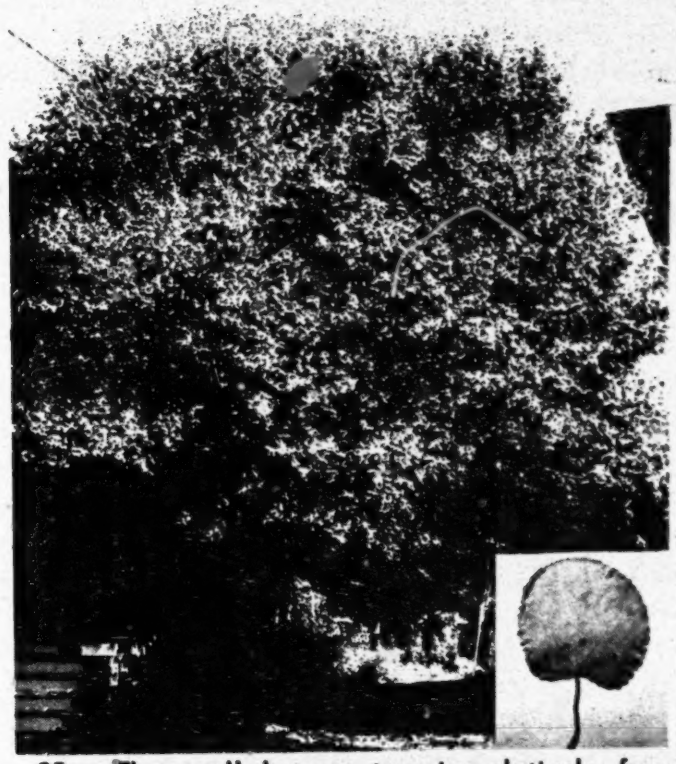

Fig. 35. The small katsura tree is relatively free of diseases and insect pests in the United States. The tree pictured here was top-pruned beneath power lines. Its round to somewhat heart-shaped leaves (inset) turn yellow to purplish-red in autumn.

slender, ascending branches which later become spreading. In Japan, it may grow to a height of 100 feet. Although it may be used in plantings throughout the state, it grows best in a deep, rich soil that contains plenty of moisture.

The round to somewhat heart-shaped, 2- to 4-inch-long, opposite leaves (Fig. 35 inset) are deep green above and silvery green beneath, turning purplish-red and yellow in autumn. The leaf stalks and veins may be red. The inconspicuous male and female flowers, produced on separate trees, appear

before the leaves. The many-winged seeds are produced in 3/4-inch-long pods that split open when mature. Katsura trees are relatively free of diseases and insect pests in the United States.

Larch

Two larches, tamarack (Larix laricina) and European larch (L. decidua), are grown in Illinois. They are used in windbreaks and along roadsides, and are graceful trees for specimen and lawn plantings. Tamarack, also called American or eastern larch, grows as a native tree only in McHenry and Lake counties and occurs in the interior of deep sphagnum swamps and bogs. It is tolerant of poor soils, including heavy clay and coarse sand. It is a hardy, straight tree reaching a height of 40 to 50 feet. The long, drooping branches form an extended, narrow, spike-like crown in the open or a short, open crown when crowded.

Fig. 36. The tall, straight European larch, with its soft, flat leaves (inset), is a graceful specimen tree.

The 3/4- to 1 1/2-inch-long, sharply pointed, needle-like, pale blue-green leaves are borne in compact bundles of 20 to 50 at intervals on older twigs and singly in a close spiral on young shoots. They shed in autumn. The male and female flowers are produced separately on the same tree and appear with the leaves. The globe-shaped, yellow male flowers are produced on lateral branches of 1- or 2-year-old twigs. The oblong female flowers with rose-red, rounded scales are produced at the tips of short, leafy shoots along the sides of 1- to 3-year-old twigs. The 1/2- to 3/4-inch-long, somewhat oblong, chestnut-brown cones mature in the autumn of the first year. The 20 or more concave cone scales are nearly rounded and have irregular and shallow-toothed margins. Two terminally winged seeds are borne on each scale. The grayish- to reddish-brown, thin bark is minutely scaly. The brown, coarse-grained wood is fairly durable and resembles the wood of hard pine. It is used for telephone poles, fence posts, and railroad ties.

The tall European larch (Fig. 36), with its horizontal branches, reaches a height of 100 feet. It loses its pyramidal shape with age and becomes irregular. The flat, soft, bright green leaves (Fig. 36 inset) are 3/4 to 1 1/2 inches long. The 3/4- to 1 1/4-inch-long, oval cones are made up of 40 to 50 scales. The wings of the seeds extend to the upper margin of the scale. The dark, grayish-brown bark is thicker than the bark of tamarack.

The larches are relatively free of diseases and insect pests in Illinois.

Linden

The two native species of linden (basswood) in Illinois are American linden or basswood (Tilia americana) and white basswood or bee-tree linden (T. heterophylla). White basswood is rare in the state. Both species are fast-growing trees and have soft, brittle wood. They reach heights of 80 to 100 feet with a branch spread of 30 to 60 feet. Native and introduced species of linden are used for shade and specimen purposes in ornamental plantings.

American linden (Fig. 37), which occurs throughout the state, is frequently found on rich, wooded slopes, along moist stream banks, and in cool ravines. The alternate, egg-shaped, broad, lopsided, abruptly pointed leaves (Fig. 37 inset) have coarsely toothed margins. They are 5 to 6 inches long, 3 to 4 inches wide, dark dull green on the upper surface, and shiny light green beneath. The clusters of yellowish-white, sweetly fragrant,

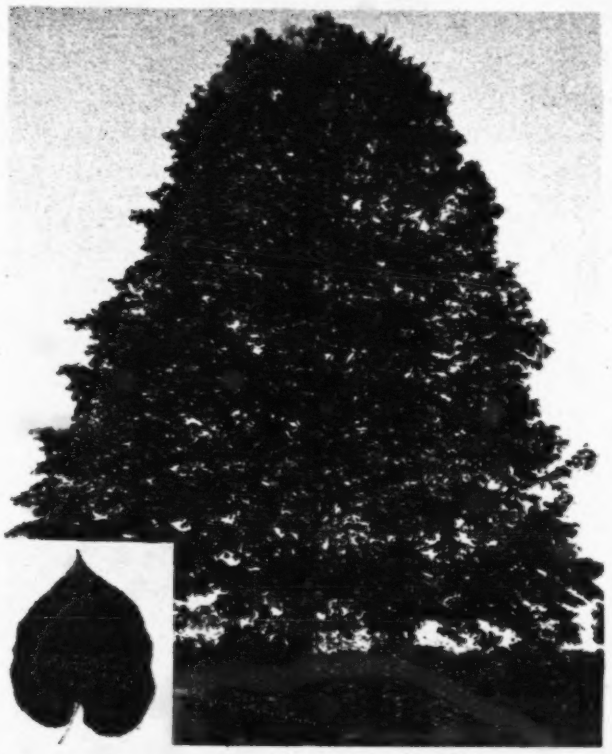

Fig. 37. American linden produces conspicuous clusters of yellowish-white, sweetly fragrant flowers. The broad, lopsided leaves (inset) are somewhat heart shaped.

nectar-bearing, perfect flowers are attractive. The globe-shaped, nutlike fruit is about 1/2 inch in diameter, woody, and densely hairy on the outside. The branches are smooth with green bark, and the furrowed trunk bark is gray, tough, and fibrous.

The wood of linden is not durable and is not suitable for fence posts, railroad ties, and other rough uses. However, it is used in the manufacture of cheap furniture, boxes, trunks, picture moldings, beekeeper supplies, musical instruments, excelsior, veneer, and paper pulp. The lindens are relatively free of diseases and insect pests. However, an occasional American linden is affected by Verticillium wilt.

Magnolia

Only one magnolia (Magnolia acuminata), the cucumber tree or mountain magnolia (Fig. 38), is native to Illinois, occurring in Alexander, Johnson, Pulaski, and Union counties in the southern tip of the state. It is usually pyramidal in shape when growing in the open but may grow columnar in shape when crowded. It is moderate to large in size, at times reaching a height of 80 to 90 feet and a branch spread of 40 to 45 feet. It is resistant to injury from ice and wind.

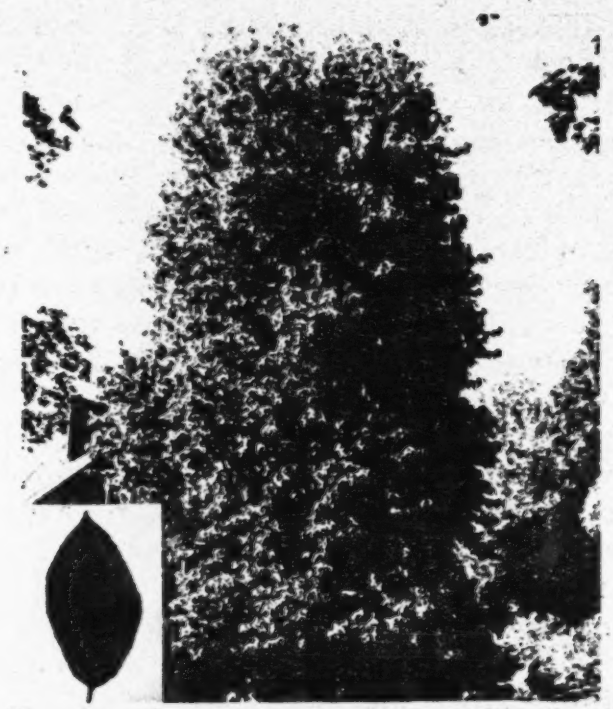

Fig. 38. Cucumber tree or mountain magnolia has large, smooth leaves (inset) and bell-shaped, greenish-yellow, inconspicuous flowers.

The very large, dark green, broadly elliptical leaves (Fig. 38 inset) are 6 to 10 inches long and 4 to 6 inches wide. They are smooth above and smooth or hairy beneath, and the margins are smooth or slightly warty. This tree and two introduced magnolias, the sweet bay (M. virginiana) and saucer magnolia (M. soulangeana) (Fig. 39), are used as specimen plants. Sweet bay and saucer magnolia are small trees or large shrubs.

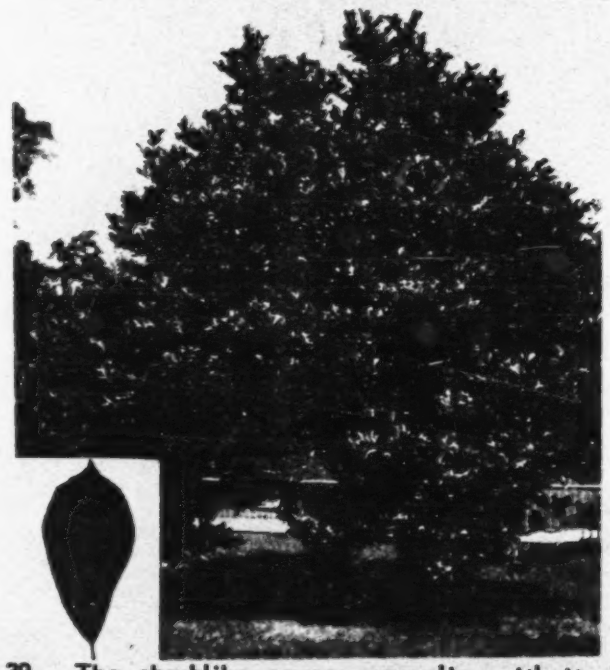

Fig. 39. The shrublike saucer magnolia, with its large leaves (inset), is prized for its large, conspicuous, purplish or rose-colored flowers which appear in early spring.

Magnolias grow most luxuriantly in loose, rich, moist, acid soil. The large, elliptical to oblong, 2 1/2- to 8-inch-long, alternate leaves of saucer magnolia (Fig. 39 inset) are dark green and smooth above and lighter green and smooth or hairy below. The 2- to 3-inch-wide, white, waterlily-like, fragrant flowers of sweet bay and the 4- to 6-inch-wide, purplish or rose-colored flowers of saucer magnolia are conspicuous, while the 2- to 3-inch-long, bellshaped, greenish-yellow flowers of cucumber tree are hidden by the foliage. The conspicuous, conelike, 2 1/2- to 3-inch-long, red fruits contain bright red seeds. However, the immature fruits are green and resemble a cucumber, hence the name cucumber tree. The trunk bark of cucumber tree is dark brown, furrowed, and scaly, while the trunk bark of sweet bay and saucer magnolia is grayish-brown and smooth.

The magnolias are relatively free of diseases and insect pests. However, an occasional tree is affected by Verticillium wilt or infested with scale insects. The yellowish-brown, close-grained wood is not hard or strong and is not used extensively in industry.

Maple

The five species of maple native to Illinois are sugar or hard maple (Acer saccharum) (Fig. 40), black maple (A. nigrum), silver or soft maple (A. saccharinum) (Fig. 41), red or scarlet maple (A. rubrum), and boxelder or ash-leaved maple (A. negundo). All but boxelder reach heights of 80 to 90 feet or more and a branch spread of 50 to 80 feet. Boxelder usually does not grow over 50 feet tall with a branch spread of 30 to 50 feet. These species, with several of their varieties, and several European and Asiatic species, are used extensively in ornamental plantings.

Fig. 40. The slow-growing, sturdy, sugar maple is prized for the autumn color of its five-lobed leaves (inset), which varies from bright yellow to brilliant scarlet.

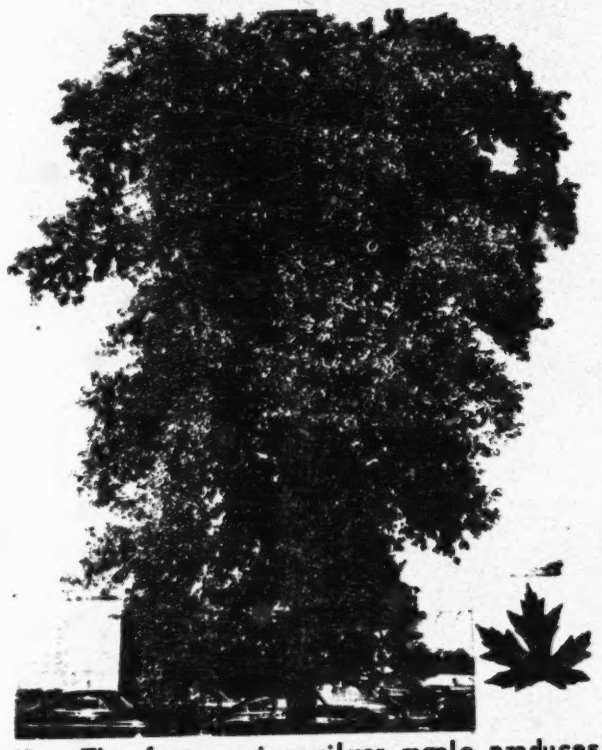

Fig. 41. The fast-growing silver maple produces long, slender branches that are easily broken by wind and ice. The leaves (inset) are more deeply lobed than the leaves of sugar maple.

The leaves, except on boxelder, are simple, three- to five-lobed, opposite, and borne on long slender stalks which are 2 to 4 inches long in red maple and 4 to 5 inches long in silver maple. The leaves of boxelder are compound with three to five irregularly toothed leaflets with pointed tips. The lobes of silver maple trees (Fig. 41 inset) are deep with long points, and those of the other three maples are shallow. Leaves of sugar maple (Fig. 40 inset) and black maple are dark green above and paler beneath, while the leaves of red and silver maple are light green above and whitish to silvery-white beneath.

Fall color in maples varies from yellow to scarlet. The flowers are produced in clusters from lateral or terminal flower buds. They may be perfect or the male and female flowers may be produced separately on the

same tree or on separate trees. The flowers of boxelder are regularly produced on separate trees. The U- or V-shaped fruit, known commonly as "maple keys," and composed of two single-winged seeds, is produced in late spring on red and silver maple and in autumn on sugar and black maple and boxelder. The bark of maples varies from light gray to dark brown or black. It is fissured and rough on boxelder, sugar, and black maple and scaly on red and silver maple.

The rapidly growing Norway maple (A. platanoides), with its broad, dense head, dark bark, and foliage similar to sugar maple, is planted widely along streets and in lawns and parks. However, its dense shade prevents good growth of lawn grasses. It may reach a height of 90 feet with a branch spread of 40 to 60 feet. The slow-growing sugar maple is planted extensively as a street, lawn, and specimen tree and is also a woodland tree. It is resistant to injury from ice and wind. Several varieties of sugar maple, especially those of columnar habit, are well adapted for planting along narrow streets. The brittle wood of the rapidly growing silver maple and boxelder is easily broken by wind and ice. Silver maple also may be severely damaged by infestations of cottony maple scale, and the leaves are frequently deformed by the maple bladder-gall mite. Verticillium wilt is the most destructive disease of maples and it most frequently affects Norway and sugar maples in Illinois.

Silver maple and boxelder have relatively little economic value for wood products. Sugar maple has hard, fine-grained, heavy wood. It is one of the most valuable Illinois hardwoods and is used in the manufacture of numerous products including furniture, flooring, farm implements, musical instruments, boxes, crates, toys, trunks, and veneer. The highly decorative "birdseye" maple used in paneling for walls, cabinets, and beds, and the ornamental "curly" maple used extensively in cabinets. are obtained from sugar maple. Maple sugar and maple syrup are made from sugar maple sap and can be made from boxelder sap.

Mountain ash

American mountain ash (Sorbus americana) and European mountain ash, sometimes called rowan tree, (S. aucuparia) (Fig. 42) are small, round-headed trees which grow to heights of 25 to 35 feet. They are attractive in ornamental plantings because of their small size, compound leaves, white flowers, and showy orange to red fruits.

Fig. 42. European mountain ash produces attractive white flowers in the spring and showy orange to red fruit in autumn. Each compound leaf (inset) is composed of 9 to 15 leaflets.

The yellowish-green, alternate, compound leaves of American mountain ash are 6 to 10 inches long and consist of 13 to 17 sharply pointed, finely toothed, oblong to lance-shaped leaflets. The dense flat-topped clusters of small white flowers, 3 to 5 inches wide, appear before the leaves are fully grown. The round, bright, orange-red, fleshy fruit is about 1/4 inch in diameter and it contains a 1/8-inch-long, brown seed. The gray bark is thin and smooth.

The leaves, flowers, and fruit of European mountain ash are similar to those of American mountain ash. However, the compound leaves (Fig. 42 inset) consist of only 9 to 15 oblong leaflets and the flowers and bright orange fruits are more showy. Both trees thrive in most soils, but American mountain ash grows best in loamy, acid soil and in cool locations. European mountain ash is planted more extensively than American mountain ash because it is more shapely and produces more brilliantly colored fruit, but it appears to be more susceptible to the bacterial disease called fire blight.

Oak

Oak is valued highly for shade and orna-

mental purposes in lawn, parkway, and park plantings. In recent years many new housing developments have been built in established oak plantings and the trees are highly prized by the homeowners. However, oak trees frequently do not survive the injuries to which they are subjected in the development of homesites. Injuries to trunks and roots often result from soil excavations, grade changes, and changing of water levels in the soil.

All native species of oak except white (Quercus alba) and swamp white (Q. bicolor) prefer an acid soil. Pin oak (Q. palustris) is probably the species most sensitive to soil reaction. Its leaves frequently become yellow between the veins when the soil is above pH 6.7. This yellowing of foliage, called chlorosis, is most commonly associated with iron deficiency in Illinois.

The oaks are well known for their interesting fruit, the acorn. The various species of oak are usually divided into two major groups, the white oaks and the black oaks. These two groups are easily distinguished by their leaves. The white oak group has leaves with rounded, bristle-free lobes. The black oak group has leaves with bristle-tipped lobes that are not rounded, or leaves that are entire with bristles at the tip.

Of the 18 species of oak native to Illinois, most are relatively large trees which grow to heights of 50 to 90 feet. The blackjack oak (Q. marilandica), commonly called scrub oak, is a small tree. It reaches a height of 20 to 40 feet and may grow shrublike in appearance. It has an open, narrow, round-topped crown with drooping branches.

Pin oak (Q. palustris) (Fig. 43), used extensively for shade and ornamental purposes, grows to a height of 70 to 80 feet. However, it is subject to chlorosis as described above. It is a moderately large tree which grows more rapidly and is more easily transplanted than other species of oak. It produces numerous, slender branches that are usually pendulous at the ends. The alternate leaves (Fig. 43 inset) are dark green, with five to seven deep lobes, and measure 4 to 6 inches long and 2 to 4 inches wide. They are shiny above and paler, with tufts of pale hairs in the axils of the large veins, below. The male

Fig. 43. The moderately large pin oak grows more rapidly than most other oaks. Its leaves (inset) have five to seven deep, sharp-pointed lobes.

and female flowers are produced separately on the same tree. The male flowers are produced as 2- to 3-inch-long catkins and the female flowers are short, reddish, hairy spikes, often in pairs. The small, 1/2-inch-long, globe-shaped, bitter-kernelled acorn is enclosed one-third of the way with a thin saucer-shaped cup. The trunk, usually not over 2 to 3 feet in diameter, is generally covered with smooth, gray to dark brown bark.

Other oaks used rather extensively in shade and ornamental plantings are red oak (Q. borealis), white oak (Q. alba), and bur oak (Q. macrocarpa). Red oak (Fig. 44) is a large tree with a narrow crown of stout branches. It grows to a height of 80 to 90 feet. The smooth, alternate leaves (Fig. 44 inset) are divided almost halfway to the midribs into 7 to 11 lobes, and usually each lobe has three smaller, bristle-tipped lobes. The leaves are dull green above, yellow-green below, and from 5 to 9 inches long and 4 to 6 inches wide. The 4- to 5-inch-long male catkins and the short, hairy female spikes are borne separately on the same tree. The female flowers are borne in the axils of the new leaves. The 1-inch-long, oblong acorn is somewhat hairy at the cup end. The bitter-kernelled nut is one-fourth to one-third en-

Fig. 44. Red oak, a sturdy tree, is similar to pin oak in rate of growth. The leaves have 7 to 11 lobes and each lobe is bristle tipped.

closed by a saucer-shaped cup. The trunk bark is dark brown and is fissured into low, continuous, flat-topped ridges. Red oak is one of the faster-growing oaks. It is resistant to injury by ice and wind and is relatively easy to transplant. It is useful as a specimen or lawn tree and in large gardens and wide parkways.

White oak (Fig. 45) is a large tree with stout branches that are resistant to injury by ice and wind. It grows to a height of 80 to 100 feet. The smooth, alternate leaves (Fig. 45 inset), bright green above and pale green below, are shallow to deeply lobed, with seven to nine lobes. They are 5 to 9 inches long and 2 to 4 inches wide. The young unfolding leaves are soft silver-gray to red and hairy below. The 2 1/2- to 3-inch-long, hairy male catkins and the short, bright red, inconspicuous female spikes are produced separately on the same tree, the female spikes being produced at the base of the new leaves. The shiny, light brown, oval, 3/4-inch-long acorns are one-fourth enclosed in shallow cups covered with warty scales. The cups are attached to 1- to 2-inch-long stalks or directly to the twigs. The trunk bark is light gray to nearly white and is divided by shallow fissures into long, irregular, thin scales. White oak is difficult to transplant and grows very slowly. However, it is an excellent shade tree and is prized in ornamental plantings.

Bur oak (Fig. 46) is a moderately large tree with a broad crown of massive, spreading branches that are resistant to injury by ice and wind. It usually grows to a height of 60 to 70 feet but may approach 100 feet. It thrives throughout the state. It has thick, lustrous, five- to seven-lobed, alternate leaves (Fig. 46 inset) that are 6 to 12 inches long and 3 to 6 inches wide. The leaves expand from a wedge-shaped base to a very large and wavy-toothed end lobe. They are deep green above and pale green and hairy beneath. The 4- to 6-inch-long, white-wooly male catkins and the short

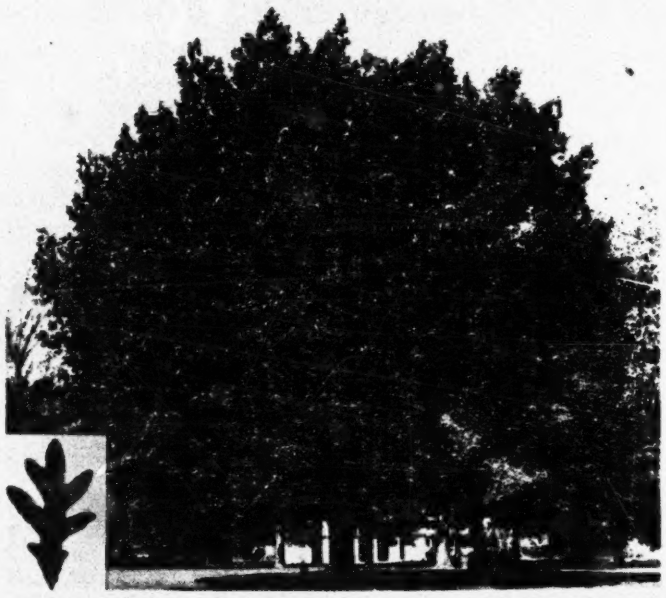

Fig. 45. The large, slow-growing, sturdy white oak is an excellent tree for shade and ornamental purposes. Its leaves (inset) have seven to nine shallow to deep, somewhat round-tipped, lobes.

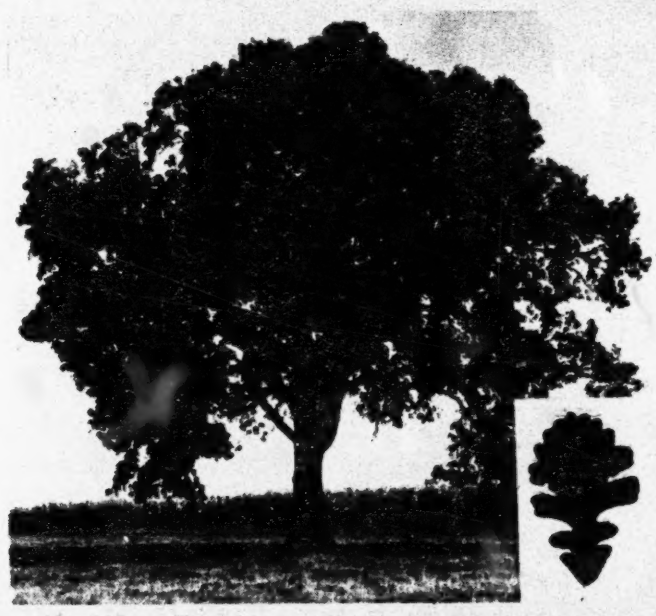

Fig. 46. Bur oak grows more rapidly than white oak, although not as fast as pin and red oak. The leaves (inset) are thick and lustrous and have round-tipped lobes.

female spikes, produced separately on the same tree, stand on slender, wooly stems. The 3/4- to 1 1/2-inch-long, dark chestnut-brown acorns are one-third to one-half covered with a thin cup supported on a 1/2-inch-long, stout stalk. The pale brown trunk bark is deeply furrowed and plated. The branches are unusual because of the ribbed and corky formation of bark. Bur oak grows more rapidly and is more easily transplanted than white oak. It is highly prized as a shade and ornamental tree.

The other native oak species in Illinois are used occasionally for shade or specimen purposes. Species such as black oak (Q. velutina), chinquapin oak (Q. muhlenbergii), scarlet oak (Q. coccinea), basket oak (Q. prinus), shingle oak (Q. imbricaria), and willow oak (Q. phellos) are available at some commercial nurseries.

Although oaks are occasionally attacked by insects, including periodical cicada, oak kermes, leaf miners, and gall-producing insects, the amount of damage caused is usually limited or localized and does not warrant annual treatment for insect control. Oak wilt is the only widespread and destructive disease of oaks in Illinois. However, this fungus disease occurs mainly among trees in forest and woodlot plantings and generally is not a serious threat to the sparsely planted oaks in ornamental plantings, especially where oaks are not growing close enough to one another for their roots to become grafted. Spread of the oak wilt fungus occurs most readily through grafted roots between adjacent trees.

Oak is the principal hardwood tree used in the wood industry. Most species of oak have strong, close-grained, tough, durable wood that is suitable for a wide variety of uses, including fence posts, railroad ties, mine timbers, barrels, furniture, interior finishing, and fuel.

Pagoda tree

Japanese pagoda tree or Chinese scholar tree (Sophora japonica) (Fig. 47), introduced into the United States from eastern Asia in 1747, is a dense, round-headed tree with spreading branches. It reaches a height of 60 to 70 feet, with a branch spread of 40 to 60 feet. It thrives in most soils and is suitable for city plantings and specimen trees on lawns in the southern two-thirds of Illinois.

Fig. 47. Japanese pagoda tree produces showy clusters of pea-like, creamy-white flowers in July. The compound leaves (inset) are composed of 7 to 17 leaflets 1 to 2 inches long.

The odd, feather-like, compound, 6- to 10-inch-long leaves (Fig: 47 inset) have 7 to 17 narrowly oval, opposite leaflets 1 to 2 inches long. The leaflets are dark green and lustrous above and more or less hairy or fuzzy beneath. The pea-like, creamy-white, 6- to 10-inch-long, showy clusters of perfect flowers appear in July. The fruit is a few- to many-seeded pod 2 to 3 inches long, 1/3 inch across, and constricted between seeds. The fissured bark on the trunk is grayish brown while the smooth or nearly smooth bark on the twigs is dark green. Pagoda trees are relatively free of diseases and insect pests. However, an occasional tree is affected by Verticillium wilt.

Persimmon

The persimmon (Diospyros virginiana) (Fig. 48), with its round-topped crown of spreading and somewhat drooping branches, frequently grows to a height of 25 to 30 feet and it may reach a height of 40 to 50 feet, with a branch spread of 30 to 40 feet. It prefers light, sandy, well-drained soil but also thrives in poor soil. It is native and widespread in the southern two-thirds of the state, and in southern Illinois it spreads rapidly in abandoned fields. Persimmon is suitable for ornamental plantings and has conspicuous, edible fruit and attractive orange to red foliage in autumn.

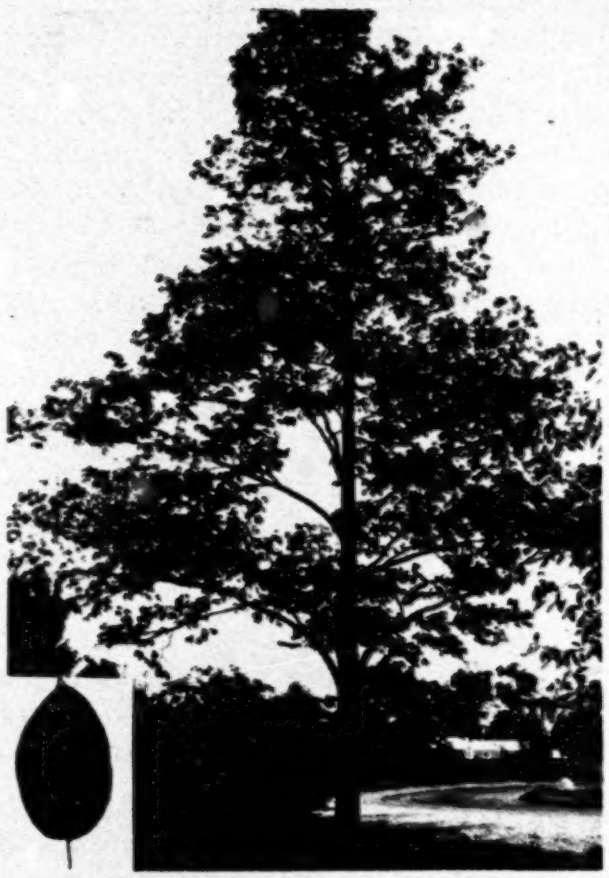

Fig. 48. Persimmon is noted for its round, pulpy, edible fruit. Its leaves (inset) are oblong, leathery, and shiny.

The firm, dark green, shiny, oblong, alternate leaves (Fig. 48 inset) are 4 to 6 inches long and 2 to 3 inches across. The male and female flowers are produced on separate trees and appear when the leaves are about half grown. The male flowers are produced in groups of two or three on hairy stalks. The creamy-white female flowers are produced singly at the ends of recurved stalks. The round, pulpy, yellow to orange fruit, up to 1 1/2 inches in diameter, contains several flattened, hard, smooth seeds. The yellowish to light brown flesh of the fruit is very delicious and is used to make a rich and appetizing pudding.

The heavy, dense, hard wood of persimmon is used extensively in making wood articles which must withstand hard use. The heartwood is black and is sometimes called American ebony. Persimmon wilt, the only destructive disease of persimmon, has killed many trees in the southeastern states but has not been found in Illinois.

Pine

Pines are quite resistant to injury by ice and wind, and are used extensively in Illinois in windbreak and forest plantings as well as for specimen trees in ornamental plantings. They prefer an acid soil.

The male and female flowers are produced separately and as small cones on the same tree. The pollen is disseminated by wind.

The three pines native to Illinois are eastern white pine (Pinus strobus), jack pine (P. banksiana), and short-leaf pine (P. echinata). Introduced species that are planted extensively include red pine (P. resinosa), mountain pine (P. mugo), loblolly pine (P. taeda), pitch pine (P. rigida), Austrian pine (P. nigra), Scotch pine (P. sylvestris), and western yellow pine (P. ponderosa). Limber pine (P. flexilis) is used occasionally in ornamental plantings.

Eastern white pine (Fig. 49) is a tall, pyramidal, fast-growing tree which reaches a height of 100 feet or more. It grows on a wide variety of soils but makes the best growth on sandy loam soil. In dense stands it is devoid of branches a long distance upward. The trunk is straight, slightly tapered, and not divided to a height of 60 feet or more. The branches are produced in whorls like the spokes of a wheel, and usually there are five branches in each whorl.

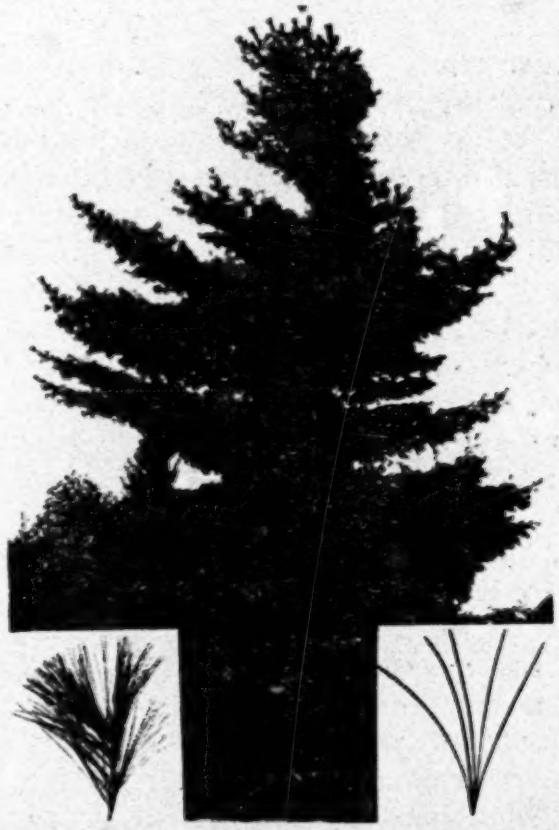

Fig. 49. White pine is called a five-needle pine because its needles are produced in bundles of five (right inset) and each bundle is held together by a common sheath. Left inset shows numerous bundles of needles attached to the tip portion of a branch.

The flexible, three-sided, blue-green needles (Fig. 49 insets) are 3 to 5 inches long, grow in bundles of five, and remain on the tree for two years. The very small, pollen-bearing cones are about 1/3 inch long, in clusters of 12 to 18, and are produced at the base of the current-season growth. The seed-bearing cones are produced on other twigs. They are solitary or in small groups of two to five and at first they are stalked, upright, cylindrical, and about 1/2 inch long. By July of their second year these green cones are 4 to 6 inches or more in length and hang downward on long stalks. They turn brown and shed their seeds by autumn and drop to the ground during the following winter and spring. The dark gray bark of white pine is fairly thick on large trees and is divided into broad, continuous ridges by shallow, longitudinal, connecting fissures.

White pine is used extensively as a specimen tree in ornamental plantings. However, it is susceptible to the destructive white pine blister rust disease which has been found in some plantings in northern Illinois. Also, some insects, such as sawfly, white pine weevil, pine needle scale, and pine bark aphid may attach white pines.

Jack pine, with its ragged outline, may grow to a height of only 15 to 40 feet and have broad, open, stunted, irregular crown, or grow to a height of 60 feet and become picturesque with age. This tree thrives on poor, dry, sandy or rocky soil. The stout, stiff, 3/4- to 1 1/4-inch-long needles, sometimes curved and twisted, grow in bundles of two. The pollen-bearing cones are oblong and occur in clusters at the base of the new growth. The smaller seed-bearing cones are globular to oval and are in clusters of two to four on the side of the shoot. With age they become yellow, oblong to conical, curved, and 1 1/2 to 2 inches long. They cling to the tree for a decade or so and do not shed their winged seeds for several years. The dark brown bark on old trees is tinted red and is divided irregularly into narrow, rounded, scaly ridges. Jack pine is used only occasionally in ornamental plantings and mainly for its picturesque appearance. Also, it may be attacked by such insects as sawfly, white pine weevil, and Nantucket pine moth.

Short-leaf pine is a tall, straight, slender-trunked tree which may grow to a height of 80 to 100 feet. It thrives in well-drained, gravelly or sandy soils. The branches form a large oval to round crown. The dark, blue-green, slender, soft, flexible, finely-toothed needles are abruptly pointed, 3 to 5 inches long, and in bundles of two or three. The crowded clusters of yellowish-purple, pollen-bearing cones are about 3/4 inch long. The pale rose, seed-bearing cones are produced on short, stout stalks in pairs or in groups of three or four, near the end of the current season's growth. The chestnut-brown, mature cones, 1 1/2 to 3 inches long, remain attached to the branches for several years. The thick, cinnamon-red bark is broken into irregularly angular, scaly plates by a network of deep fissures. Short-leaf pine is a relatively slow-growing tree, is difficult to establish, and has only limited use in ornamental plantings.

Red or Norway pine (Fig. 50) is a tall, pyramidal tree, with stout branches which are sometimes pendulous, that grows to a height of 50 to 75 feet. It is adapted to various soil conditions and grows better than white pine on light, sandy loam soil. It thrives under low to medium rainfall. The soft, flexible, dark green needles (Fig. 50 insets) are 5 to 7 inches long, in bundles of two, and gen-

Fig. 50. Red pine has two long, flexible needles (right inset) in a bundle. Left inset shows numerous bundles of needles attached to the tip portion of a branch.

erally at the ends of the branches. The dense spikes of pollen-bearing cones are dark purple. The seed-bearing cones require two years to mature. They are small, scarlet, and upright during the first year, become pendant the second year, and are 1 1/2 to 2 1/4 inches long when mature. Each scale bears two terminally winged seeds. The reddish-brown bark is broken into scaly plates by a network of shallow fissures. Red pine is used sparingly in ornamental plantings. However, it may be used for bold effects where few other pines grow. It is susceptible to Dothistroma needle blight, a fungus disease.

Mountain pine, sometimes called Swiss mountain pine, is usually grown as a low, spreading shrub or as a pyramidal tree which may reach a height of 25 feet. The dwarf form is called mugo pine (Fig. 51). This is a hardy tree which thrives in stony and dry soil and is

Fig. 51. The shrublike mountain pine has two stout, twisted needles in a bundle (right inset). Left inset shows numerous bundles of needles attached to the tip portion of a branch.

resistant to cold. The bright green, twisted, stout needles (Fig. 51 insets) are 1 1/2 to 3 inches long and crowded two in a bundle. The small, pollen-bearing cones form in clusters at the base of the current season's growth. The mature, tawny-yellow to dark brown, oval-shaped, seed-bearing, cones are 3/4 to 2 1/2 inches long. The bark is gray and scaly. Mountain pine is relatively free of diseases but may be attacked by such insects as pine needle scale and European pine shoot moth.

Loblolly pine is a tall, straight-trunked tree that may grow to a height of 80 to 100 feet. It has a compact, round-topped crown composed of short, thick, spreading branches. The upper branches tend to droop downward. The dark green, slender, stiff, slightly twisted needles are 6 to 9 inches long and in bundles of three. The small, yellow, pollen-bearing cones are clustered at the base of young shoots. The yellow, seed-bearing cones are produced singly or in groups on short stalks. The mature cones are reddish brown, somewhat oval to oblong, and 2 to 5 inches long. The bright reddish-brown bark is irregularly divided into broad, flat ridges by a network of shallow fissures. The coarse-grained, weak, brittle wood is used for interior finishing and general construction purposes.

Pitch pine is a tall tree, with an open, irregular head of short, horizontal branches, that grows to a height of 50 to 75 feet. The rigid, spreading, dark green needles are 3 to 5 inches long and three in a bundle. The crowded spikes of pollen-bearing cones are yellow or rarely purple. The seed-bearing cones require two years to mature and develop as do those of red pine. They are oval shaped, 2 to 3 1/2 inches long, often clustered on raised or short, stout stems, and persist for many years. Each scale has a sharp prickle and bears two terminally winged seeds. The reddish-brown bark is broken into broad, scaly ridges by deep fissures. Pitch pine will grow on dry, sandy or rocky soils too poor to support most other trees, and the old trees are frequently picturesque.

Austrian pine is a large, massive-appearing tree which grows to a height of 60 to 90 feet, and has numerous rough branches placed regularly around the trunk. The straight, slender, long, rigid, dark green needles are 3 to 7 inches long and two in a bundle. The pollen-bearing cones form at the base of current-season shoots. The yellowish-brown, lustrous, seed-bearing cones are 2 to 3 1/2 inches long when mature. The reddish-brown bark is deeply fissured into scaly plates. Although Austrian pine grows best in rich, light, loam soil with a well-drained subsoil, it also thrives in poor soil and will grow in sand fills. It is resistant to gas and smoke fumes in cities, to saltwater spray along seashores, and to drought conditions. For many years it was one of the favorite pines. However, in recent years it has been grown less extensively because it is frequently attacked by borers and by Dothistroma needle blight, a fungus disease.

Scotch pine grows fast and is pyramidal in shape when young. With age it becomes round topped and irregular in shape, with spreading, pendulous branches, and grows to

a height of 50 feet or more. Some old trees are picturesque (Fig. 52). Some strains reach maturity in 25 to 30 years and then die, while other strains mature more slowly and live much longer. In recent years some strains of Scotch pine, especially those from Latvia, have been planted extensively for Christmas trees. The dull, grayish-yellow twigs and the yellowish to cinnamon-red bark are distinctive. The rigid, bluish-green, twisted needles (Fig. 52 insets) are 1 1/4 to

Fig. 52. These tall Scotch pines are irregular in shape and devoid of branches a long distance upward. The tree to the right has a twisted trunk, common with age. The short needles are two in a bundle (right inset). Numerous needles on a shoot tip are shown in the left inset.

3 inches long and two in a bundle. The pollen-bearing cones are turned downward and are rough with short, hard points. The seed-bearing cones have short stalks, are symmetrical or occasionally oblique, and are turned downward. The cone scales are pointed backward. Scotch pine grows rapidly in acid or poor, sandy soil. It is relatively resistant to cold, drought, and drying winds. It may be attacked by several insects including sawfly, white pine weevil, pine bark aphid, European pine shoot moth, and Zimmerman pine moth.

Western yellow pine is a tall, hardy tree, with a narrow, pyramidal head and stout, spreading (sometimes pendulous) branches, that commonly grows to a height of 80 feet but may reach 150 feet or more. It grows best on moist but well-drained, deep soil and will thrive on pure clay as well as on sand or gravel. The orange-brown twigs are fragrant when broken. The bark is cinnamon-red to dark brown or nearly black and fissured into ridges which become large plates on old trees. The rigid, dark green needles are 5 to 11 inches long. Some trees have only two needles in a bundle while others have two needles in some bundles and three needles in others. The small, yellow, pollen-bearing cones are clustered at the base of young shoots. The oval-shaped, bright green to purple, fully grown, seed-bearing cones become reddish brown and 3 to 6 inches long when mature. The tips of the thin cone scales are thickened and armed with slender prickles. Western yellow pine is used for screening and as background plantings in landscaping. It is an important timber tree in the West.

Limber pine (Fig. 53) is a narrow, pyramidal tree when young. It becomes broad and round topped with age and reaches a height of 45 to 75 feet. It thrives on a moist, well-drained, sandy loam soil, but it will tolerate

Fig. 53. Limber pine becomes broad and round topped with age. The twisted needles (right inset) are in bundles of five. Numerous needles on a shoot tip are shown in the left inset.

poor soil. The branches are horizontal, pendulous, and extremely flexible. The dark green needles (Fig. 53 insets) occasionally have a bluish cast. They are 1 to 3 inches long, in bundles of five, and are shed in their fifth and sixth years. Each bundle of needles is twisted in a different direction. The branches are hairy at first but soon become smooth. Because of its tough, flexible characteristics, the tree is called limber pine. The small, reddish, pollen-bearing cones are clustered at the base of young shoots. The seed-bearing cones are green or rarely purple at maturity, somewhat cylindrical, 3 to 10 inches long, and about 1 inch broad. The dark brown seeds, 1/2 inch or less long, have thick shells. The bark, which is gray and smooth when young, becomes dark brown and deeply fissured with age.

Limber pine is used occasionally in ornamental plantings. It is relatively free of diseases and insect pests. The soft, light, close-grained wood is clear yellow but turns red when exposed to air. It is used occasionally for lumber.

Fig. 54. Wild plum produces small clusters of white flowers before the leaves appear in the spring and round fruit that ripens in the autumn. The long-pointed leaves (inset) have sharp-toothed margins.

Plum

Two plums, wild plum (Prunus americana) and wild goose plum (P. hortulana), are native to Illinois. These and several introduced species and selections are used in ornamental plantings because of their showy flowers and conspicuous fruits, or sometimes, as in the case of the purple-leaf plum, because of their foliage color.

Wild plum (Fig. 54), with its broad head formed from many spreading, upright branches, is common throughout the state. It grows on various types of soils and reaches a height of 20 to 30 feet, with a branch spread of 10 feet. The long-pointed, egg-shaped, firm, alternate leaves (Fig. 54 inset), 2 1/2 to 4 inches long and 1 1/2 inches wide, have sharply toothed margins and are dark green above and paler beneath. They are smooth when young but become wrinkled with age. In early spring, the conspicuous, white, perfect flowers appear before the leaves. They are produced in small clusters and the petals are bright red at the base. The 1-inch diameter, round fruit turns bright red upon ripening and contains a flattened, rough, oval pit. The fruit makes excellent jellies and preserves. The red-tinted, brown bark is divided by fissures into plates. Although the close-grained wood is heavy, hard, and strong, it has no commercial value.

The wild goose plum, with its broad crown of rigid, spreading branches, grows to a height of 25 to 30 feet. It is common in most of southern and western Illinois. The shiny, thin, dark green, alternate leaves are smooth above and slightly hairy beneath. They are 4 to 6 inches long and 1 inch or more wide, and have finely toothed margins. The small clusters of perfect flowers, with white petals that frequently are orange tinted at the base, appear mostly before the leaves. The round to slightly oval, hard-fleshed fruits, 3/4 to 1 inch in diameter, are covered with a thick, tough, red or yellow skin and contain rough, pitted stones. The dark brown bark is thinly plated. Many horticultural varieties have been developed from the wild goose plum. The heavy, hard, strong, close-grained wood is suitable for lathe work.

Redbud

Redbud or Judas tree (Cercis canadensis) is a small, slow-growing tree (Fig. 55) that may occasionally grow to a height of 35 feet and have a branch spread of 20 to 30 feet. The trunk seldom measures over 1 foot in diam-

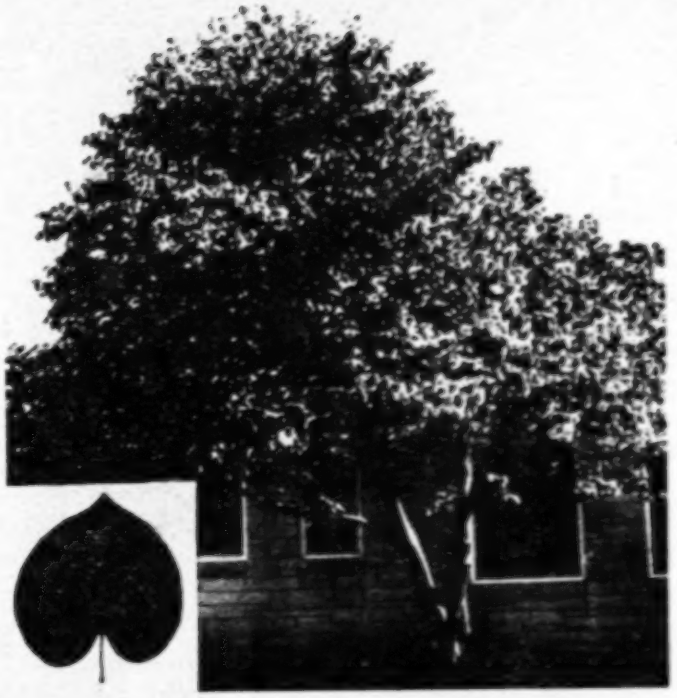

Fig. 55. The small, slow-growing redbud is prized for its brilliant rosy-red, pea-like flowers. They appear in early spring before or at the time the heart-shaped leaves (inset) unfold.

eter. Redbud is native to Illinois except in the northeastern part of the state. It thrives best in moist, rich soil and in partial shade and may be injured by hot, dry weather. It has stout branches which usually form a wide crown. Redbud is conspicuous in early spring because of the brilliant rosy-red, pea-like, perfect flowers which form in clusters on the twigs and small branches. Flowers appear before or at the time the leaves are unfolding. Because of this flowering habit redbud is used extensively in ornamental plantings.

The glossy green leaves (Fig. 55 inset) are alternate, nearly circular to heart-shaped, and 3 to 5 inches in diameter. Margins are entire and each stem has a bulbous swelling at each end. The leaves turn bright yellow in autumn. The fruit, which contains many seeds, develops as a thin, oblong, flat pod that is 2 to 4 inches long and has tapered ends. It is reddish during the summer, becoming brown in the fall, and may remain attached to the branches for most of the winter. The bark is red-brown, scaly, and deeply fissured.

Redbud is resistant to injury by ice and wind. It is subject to two fungus diseases, Verticillium wilt and Botryosphaeria canker, each of which may result in the death of affected trees. Occasionally the foliage is damaged by the two-spotted spider mite, which can be controlled by spraying with a miticide. The rich, dark brown, close-grained wood is weak and has very little commercial value.

Russian olive

Russian olive or oleaster (Elaeagnus angustifolia), native of central and western Asia and southern Europe, is a low-growing, somewhat shrublike tree (Fig. 56) that is hardy throughout Illinois. It develops a crooked trunk with an irregular crown of silvery twigs, and is sometimes spiny. It reaches a height of 20 feet, with a branch spread of 20 to 40 feet. Russian olive is used in background or group plantings where silvery-white foliage and gray twigs are desired.

Fig. 56. Russian olive has distinctive foliage. The blunt-tipped, lance-shaped leaves (inset) are whitish green above and silvery beneath.

The 1 1/2- to 3-inch-long, lance-shaped, blunt-tipped leaves (Fig. 56 inset), with smooth margins, are whitish-green above and silvery beneath. The small, fragrant, inconspicuous, perfect flowers, silvery on the outside and pale yellow within, appear in June. The 1/2-inch-long, sweet, mealy, oval, one-seeded, yellow fruit, covered with silvery scales, ripens in August. Although the smooth branches are brown, the twigs are covered with gray, star-shaped hairs. The dark gray trunk bark is furrowed, and it becomes scaly with age. Russian olive is relatively free of insect pests and resistant to injury by ice and wind. An occasional tree is affected by Verticillium wilt.

Sassafras

Sassafras (Sassafras albidum) (Fig. 57), with its stout, almost horizontal branches, may grow as a small, flat-topped tree in poor soil, reaching a height of only 40 to 60 feet. However, on rich soil it may reach a height of 80 to 90 feet. Branch spread varies from 25 to 40 feet. It is common in abandoned fields and along fence rows, preferring a rich, sandy, well-drained soil. It grows throughout the southern two-thirds of the state. It is useful in ornamental plantings, especially around low, one-story buildings and in borders or backgrounds. Sassafras tea, a delicious drink, is made from the roots.

Fig. 57. Sassafras has aromatic leaves which vary from those with no lobes (left inset) to those with three lobes (right inset). Some leaves resemble mittens.

The rather firm, alternate, dark green, egg-shaped, aromatic leaves, 4 to 6 inches long and 2 to 4 inches wide (Fig. 57 insets), vary from entire to three-lobed and some resemble a mitten. They turn orange-scarlet in autumn. The attractive yellow clusters of male and female flowers are formed in the spring on separate trees. The dark blue, lustrous fruit is usually 1/4 to 1/2 inch long. It is a one-seeded berry in a small, orange-red or scarlet cup which stands on a scarlet stem that is 1 1/2 to 2 inches long. The young twigs are hairy, bright green, and aromatic. The dark cinnamon-brown bark is deeply furrowed with horizontal cracks. Although the wood is fairly soft and light, it is durable and is used for fence posts, rails, and railroad ties.

Serviceberry

Serviceberry, shadbush, shadblow, or juneberry (Amelanchier arborea) (Fig. 58), a small native tree with spreading branches, grows to a height of 30 feet and on occasion may reach 50 feet. It prefers partial shade and grows more commonly on rocky slopes or cliff tops. It is useful in decorative plantings but is somewhat difficult to grow.

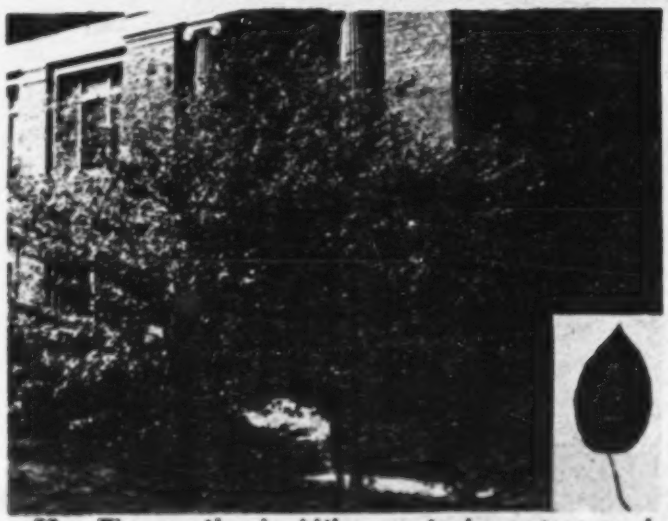

Fig. 58. The small, shrublike serviceberry tree produces showy white flowers in early spring before the leaves (inset) unfold. These two young trees are in a border planting.

The sharply pointed, slender-stalked, alternate leaves (Fig. 58 inset), 2 to 4 inches long by 1 to 2 inches wide, are yellowish green above and paler and somewhat hairy beneath. They have sharply toothed margins. The showy, white, perfect flowers, which appear before the leaves in early spring as erect or drooping clusters, resemble the flowers of cherry. The fruit is a round, purple, dry, insipid berry 1/4 to 1/3 inch in diameter. The thin trunk bark is conspicuous because of its light gray color and scalelike ridges. Serviceberry is seldom seriously damaged by diseases, but it is an alternate host of some of the rusts which affect junipers. The heavy, hard wood is of little commercial value although it has been used in making tool handles, bows, fishing rods and lances.

Spruce

Although it is not native to the state, spruce is one of the most common evergreens

used in ornamental and windbreak plantings in Illinois. It is also grown extensively for Christmas trees. Norway spruce (Picea abies), white spruce (P. glauca), and Colorado blue spruce (P. pungens) are excellent for windbreak plantings.

Engelmann (P. engelmanni), blackhill (P. glauca densata), Koster blue (P. pungens var. Kosteriana), Colorado blue (Fig. 59),

Fig. 59. Colorado blue spruce is prized for the bright blue-green color of its needles. Inset shows numerous needles on the tip portion of a branch.

Norway, and white spruces are used extensively in ornamental plantings. Spruces are pyramidal in shape and have scaly bark and branches in whorls. They grow best in deep, moist, sandy loam soil, and often reach a height of 50 to 70 feet.

The needles (Fig. 59 inset), usually four sided and spirally arranged, persist for several years. They vary from 1/3 to 1 inch long and from bluish green to dark green on the above species. They sit on cushion-like growths which make the deeply grooved twigs appear corrugated. Male and female flowers are borne separately on the same tree. The yellow to red catkin-like male flowers are produced in axils. The green to purple female flowers are produced terminally and develop into oval to cylindrical cones which are pendulous. Two small, compressed, winged seeds are produced under each persistent scale.

Spruce trees in ornamental plantings are frequently infested with spruce spider mites which feed on the needles, causing many needles to drop during the growing season. Spruces are susceptible to a fungus disease called Cytospora canker, which may result in the killing of lower branches and occasionally of entire trees. Norway and Colorado blue spruce are more resistant than other spruces to injury by ice and wind. The soft, light, fine-grained wood of spruce is used extensively for lumber and pulp. Wood of red and white spruce is excellent for sounding boards of musical instruments because of its resonant qualities.

Sweet gum

Sweet gum or red gum (Liquidambar styraciflua), which prefers an acid soil, is a tall-growing tree that reaches a height of 70 to 100 feet on the bottomlands that are not flooded in southern Illinois. Occasionally it is found growing in moist soil on hillsides. It is an excellent lawn tree (Fig. 60) that is well

Fig. 60. The slow-growing sweet gum is conspicuous because of its distinctive five- to seven-pointed, star-shaped leaves (inset). These aromatic leaves become brilliant yellow, orange, red, and purple in autumn.

adapted to the southern and central parts of the state.

Sweet gum produces conspicuous, five- to seven-pointed, star-shaped, aromatic, alternate leaves (Fig. 60 inset), 4 to 7 inches across, and dark green above and pale green beneath. They become brilliant yellow, orange, red, and purple in autumn. Male and female flowers are borne separately on the same tree. The hairy clusters of male flowers are 2 to 3 inches long. The clusters of female flowers are produced in swinging, globe-shaped heads. The hard, ball-like fruits, 1 to 1 1/2 inches in diameter, may be objectionable in lawns. They contain 1/2-inch-long, brown, resinous, winged seeds which are set free in autumn. The gray trunk bark may show flaky ridges.

Sweet gum is resistant to injury by ice and wind and it is relatively free of diseases and insect pests in Illinois. However, two diseases that kill sweet gum trees have been reported, one in Alabama and one in Maryland. The heavy, hard, close-grained wood of sweet gum is not very strong. However, it is used extensively in interior finishing because of the alternating streaks of red and black and the fine texture of the wood. It is also used as a substitute for walnut and mahogany in the manufacture of furniture.

Sycamore

Sycamore (Platanus occidentalis), also called buttonball and buttonwood (Fig. 61), is native to Illinois. Although it prefers moist, fertile bottomland, occasionally it is found growing on dry ridges or rock ledges, and it is grown extensively in dry, upland soils. Sycamore and two introduced species, London plane tree (P. acerifolia) (Fig. 62) and oriental plane tree (P. orientalis), are used in shade, street, and ornamental plantings. They are tolerant of drought as well as smoke and other adverse city conditions. They grow rapidly, reaching heights of 70 to 100 feet, with horizontal branches that have a spread of 50 to 75 feet.

The large, thin, firm, broad-bladed, coarsely toothed, alternate leaves (Fig. 61 and 62 insets) are 4 to 7 inches across, bright green on top and pale beneath, with fine, conspicuous hairs where the veins are attached to the midrib. Leaves of sycamore and London plane tree have three to five sharp-toothed lobes, and those of oriental plane tree have five to seven lobes. The stout leaf stems are 3 to 5 inches long. The enlarged, hollow base of each leaf stem encloses next year's bud. Male and female flowers are borne separately on the same tree. Although both types of

Fig. 61. The fast-growing American sycamore has been planted extensively in recent years where elms have died. Its maple-like leaves (inset) are broad and firm.

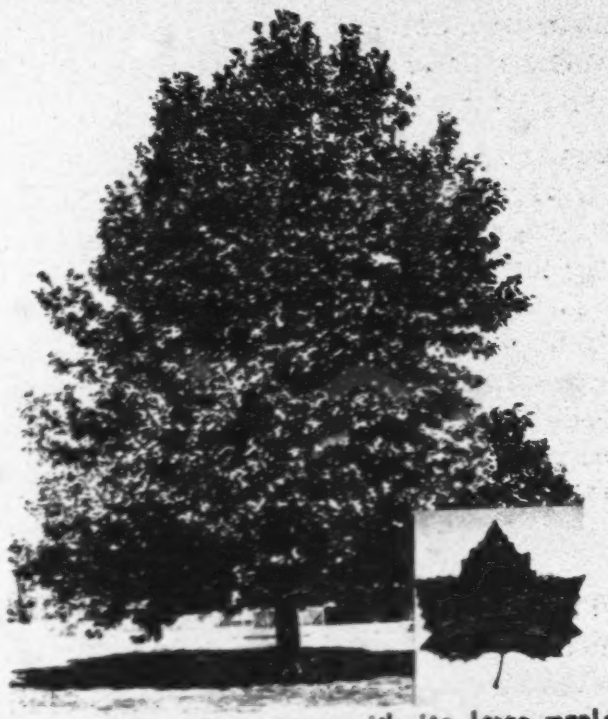

Fig. 62. London plane tree, with its large maple-like leaves (inset), is difficult to distinguish from the American sycamore. However, the bark of London plane tree is usually more greenish in color.

flowers are inconspicuous, the fruits are globose, brownish, prickly balls about 1 inch in diameter which hang from the branches by long, slender, flexible stems 3 to 5 inches long. Usually there are two balls per stem on London plane tree, two to four balls per stem on oriental plane tree, and one ball per stem on sycamore. These balls, conspicuous on the trees during the winter months, break apart in early spring, releasing the small seeds which are scattered by the wind. The trunk bark is conspicuous because of its habit of peeling off in large patches annually. It is greenish white to creamy white on sycamore and dull grayish to greenish white on London and oriental plane trees. The bark on large branches and the trunks of young trees is very smooth and greenish gray. The thick, dark brown bark on the trunk bases of old trees is divided by deep furrows.

The hard, heavy wood of sycamore, with its abundant cross grains, is difficult to split and tends to twist and warp during seasoning. It is used extensively for furniture, interior finishing, veneer, tool handles, butcher's blocks, and boxes.

Sycamore is susceptible to a fungus disease called leaf blight or anthracnose. During cool springs this disease may cause abundant killing and defoliation of young leaves, similar to the injury resulting from severe frosts. Twigs and branches may also be killed by the anthracnose fungus. This disease can be effectively controlled by applying an organic mercury fungicide at the time the buds are swelling.

Thousands of London plane trees in the Atlantic Coast region from Philadelphia to Washington, D. C. have been killed by a fungus disease called canker stain. This disease occurs principally in the eastern and southern parts of the United States. Although it was reported affecting dozens of trees in St. Louis in 1947, it has not been found in Illinois. The fungus produces cankers on branches and trunks, and seriously affected trees are killed. To control this disease, special care is required in treating or removing diseased trees and in protecting healthy trees. Information on the procedures to follow should be obtained from a plant pathologist. This disease also has been reported on sycamore, which appears to be much less susceptible than London plane tree.

Many London plane trees in Illinois show extensive trunk splitting (Fig. 10) when temperatures are quite low during the winter months. These splits or cracks are referred to as frost cracks. They may measure up to several inches across and several feet long, and they may penetrate the trunks only a few inches or to the center of the heartwood. Usually these cracks close in the spring and callus forms over them during the growing season. Callused-over, shallow cracks may not open in succeeding winters. However, deep cracks usually reopen winter after winter.

Tulip tree

Tulip tree (Liriodendron tulipifera) (Fig. 63) is frequently called yellow poplar and is

Fig. 63. The fast-growing tulip tree is sometimes called saddle tree because of the saddle shape of its four-lobed leaves (inset).

sometimes referred to as saddle tree, canoewood, whitewood, or blue poplar. It is recommended for ornamental and shade purposes throughout Illinois, although its natural range extends northward only to St. Clair County in the west and to Vermilion County in the east.

It grows rapidly and thrives on moist, well-drained soils. Tulip tree normally reaches a height of 80 to 100 feet (occasionally 150 feet) and has a branch spread of 50 to 70 feet. In the forest the straight, thick trunk may be free of branches to a height of 50 feet or more.

The smooth, shiny, saddle-shaped, alternate leaves (Fig. 63 inset) are dark yellow-green above and pale beneath. It is natural for many tulip trees to have scattered leaves turn bright yellow in late July and August. The leaves have four distinct, pointed lobes and measure 3 to 6 inches in both length and breadth. The perfect flowers, which appear in May or June, are greenish white with an orange band at the base, tulip shaped, and 1 1/2 to 2 inches long. The cone-shaped, brown fruit ripens in September and October. It is 2 1/2 to 3 inches long and contains winged seeds with a hard, bony coat. The brown bark is thin and scaly when young but becomes deeply furrowed with age. On young branches the bark is dark green and smooth at first but it soon shows scattered white spots in the developing fissures.

Although the light, soft, brittle wood is weak, it is receptive to paint and glue and is used for exterior trim, interior finishing, furniture, veneer, shingles, boats, drawing boards, tables, cabinets, toys, and novelties. Tulip tree is resistant to injury by ice and wind, but in recent years it has shown considerable susceptibility to Verticillium wilt. Most of the affected trees observed have died.

Tupelo

Two species of tupelo, tupelo gum (Nyssa aquatica) and tupelo (N. sylvatica) are native in Illinois. Tupelo, also called sour gum and black gum, produces a long, narrow crown of numerous slender, horizontal to somewhat drooping branches. It reaches a height of 70 to 90 feet, with a branch spread of 30 to 50 feet. When growing in the open it frequently does not grow so tall, and forms a round or cylindrical head (Fig. 64). It grows as a native tree in the southern third of Illinois along streams and in low, wet places. Colonies of tupelo occur in the sandy areas of Kankakee and Cook counties. It is excellent for ornamental plantings, except in the extreme northern part of the state where it may be damaged by winter injury.

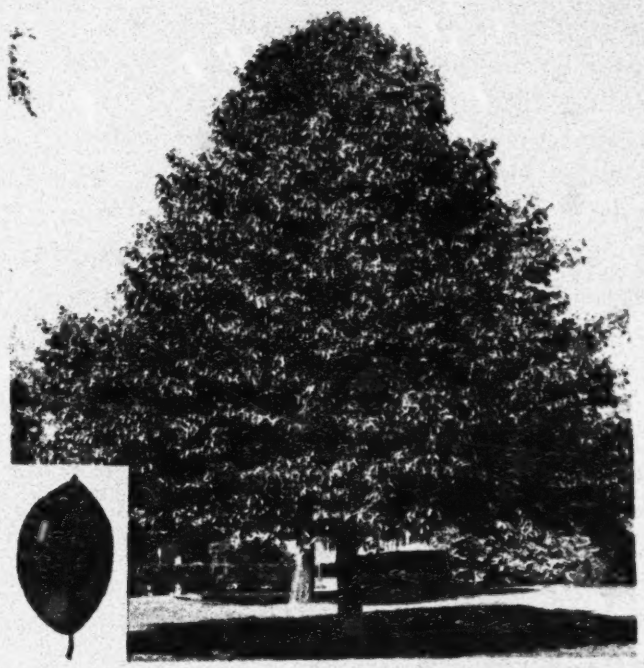

Fig. 64. Tupelo or sour gum is conspicuous in autumn because of its brilliant red foliage. The leaves (inset) are 2 to 5 inches long.

The thick, firm, shiny, smooth-margined, elliptic, alternate leaves (Fig. 64 inset) are dark green above, gray and somewhat hairy beneath, and 2 to 5 inches long by 1 to 3 inches wide. These leaves, clustered toward the ends of the twigs, turn brilliant red in the autumn. The green male and female flowers usually are produced on separate trees, although some trees bear perfect flowers. Male flowers are produced in many-flowered heads. Female flowers are produced in two- to several-flowered clusters. The dark blue, globe- to egg-shaped fruit, 1/2 to 3/4 inch long, is produced singly or in clusters of two or three on long, slender stems. The single, hard-shelled, light brown seed in each fruit is slightly flattened and has 10 to 12 longitudinal ridges. The deeply and narrowly fissured, red-tinged, brown bark is formed with a pattern of oblong blocks resembling that of alligator skin.

Tupelo is resistant to injury by ice and wind and is relatively free of diseases and insect pests. However, in recent years numerous branches of a few trees have been

killed by Botryosphaeria canker, and a few trees have been killed by Verticillium wilt. The strong, tough, heavy wood of tupelo is neither hard nor durable, and it tends to warp and twist in seasoning. However, the tough, twisted grain makes it useful for veneer, mallets, rollers, wheel hubs, gun stocks, and rough flooring.

Tupelo gum or cotton gum, with its narrow, oblong crown of small, spreading branches, reaches a height of 80 to 100 feet. In Illinois it is confined to the cypress swamps in eight counties in the southern tip of the state and Crawford, Richland, and Wabash counties. The shiny, firm, alternate leaves, 5 to 7 inches long and 2 to 4 inches wide, are dark green above, paler and hairy beneath, and may have slightly toothed margins. Male and female flowers are produced separately on the same tree, the male flowers being in dense clusters and the larger, greenish, female flowers solitary. The conspicuously dotted, dark purple, datelike fruit, about 1 inch long, has a thick, tough skin and contains a flattened seed with ten sharp, winglike ridges. The dark brown, scale-roughened bark is conspicuously furrowed. The brown to nearly white wood is soft, light, weak and difficult to season. However, it is more easily worked than that of tupelo. It is used for boxes, crates, flooring, and interior finishing.

Willow

Black willow (Salix nigra) and peach or almond willow (S. amygdaloides), both native to Illinois, have only limited use in ornamental plantings. Several introduced willows—including Babylon weeping (S. babylonica) (Fig. 65), bay or laurel-leaved (S. pentandra), white (S. alba), Wisconsin weeping (S. blanda), and yellowstem white (S. alba var. vitellina) willow—are used for landscape purposes. The willows are fast-growing trees which reach heights of 30 to 50 feet, with a branch spread of 15 to 50 feet. They prefer moist, rich soil and frequently are planted near water. However, they will thrive in dryer sites.

The leaves (Fig. 65 inset) of most willows are long and lance shaped, up to 6 inches long, and have finely toothed margins. They vary from dark to light green and shiny above and from pale green to shiny or silvery below. The undersides of leaves of the yellowstem white willow are smooth to slightly hairy with a whitish bloom that gives a silky appearance. The conspicuous male and female flowers, produced on erect catkins, are borne on separate trees. The fruits are small capsules which split at maturity to discharge the silky-haired seeds which are carried long distances by wind. Willows are conspicuous in the spring because they are among the first trees to unfold leaves and the bark on twigs is yellowish green. The brown to nearly black bark on trunks of old trees is divided by deep furrows into broad, flat, connected ridges.

Fig. 65. The fast-growing weeping willow, with its long, lance-shaped leaves (inset) is prized for its weeping or pendulous branches.

Willows growing under adverse conditions, and old trees may be attacked by borers and by Cytospora canker, a fungus disease. These troubles frequently result in death of affected trees. Although the wood of willow is fine grained, soft, and light, it is quite tough and is used for crates, baskets, boxes, charcoal, coarse lumber, and pulp.

Yellowwood

Yellowwood (Cladrastis lutea) (Fig. 66) with its broad, round, graceful crown, reaches a height of 50 to 60 feet and has a branch spread

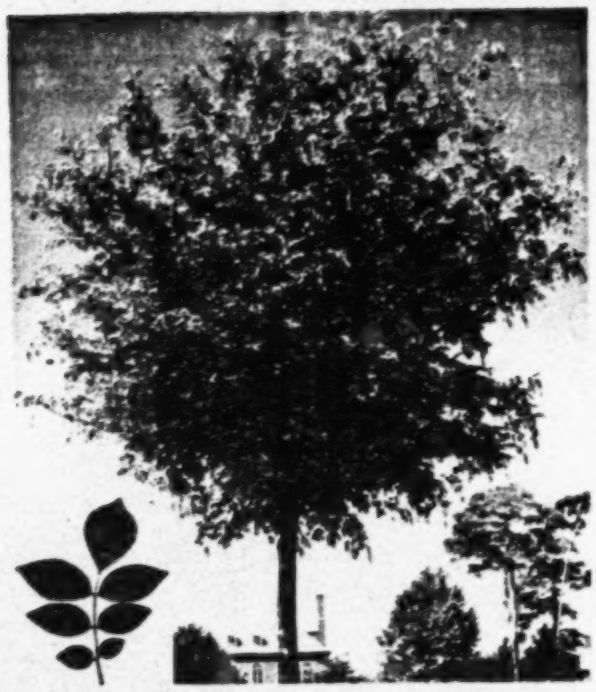

Fig. 66. Yellowwood is a medium-sized tree noted for its conspicuous clusters of beautiful and fragrant flowers. Its compound leaves (inset) are composed of 7 to 11 elliptical or egg-shaped leaflets.

of 40 to 50 feet. It prefers rich, well-drained soil, especially the limestone ridges along stream banks. It is used as a specimen tree in ornamental plantings but is somewhat difficult to transplant.

The alternate, compound leaves (Fig. 66 inset) are 8 to 12 inches long and composed of 7 to 11 elliptical to egg-shaped, smooth, bright green leaflets that are 2 3/4 to 4 inches long. The foliage turns bright yellow in autumn. The beautiful, white, fragrant, 1-inch-long, conspicuous, perfect flowers are produced in 10- to 16-inch-long, drooping clusters. The fruit is 2 3/4 to 3 1/4 inches long. It is a narrow, flattened, leguminous pod that splits open at maturity. Each pod contains three to six oblong, compressed seeds. The thin, smooth, steel gray, beechlike bark becomes fissured with age. The wood is light, hard, and strong. The freshly cut, clean, yellow heartwood soon turns brown. Yellowwood is relatively free of diseases and insect pests. However, an occasional tree is affected by Verticillium wilt.

Zelkova

Zelkova or Japanese keaki tree (Zelkova serrata) (Fig. 67), introduced into the United States from Japan about 1860, is a short-trunked and usually crooked-trunked tree with many upright stems which form a broad, round-topped head. It grows to a height of 50 to 60 feet, with a branch spread of 20 to 35 feet. It is used as a specimen tree in ornamental plantings and is hardy in the southern two-thirds of Illinois.

Fig. 67. Zelkova, used as a specimen tree in ornamental plantings, has coarsely toothed leaves (inset) that turn light yellow in autumn.

The sharply and coarsely toothed, oval to oblong leaves (Fig. 67 inset) are 1 to 4 inches long. The foliage turns light yellow in autumn. Short-stalked male, female, and perfect flowers are produced on the same tree. Male flowers are produced as clusters in the axils of the lower leaves. Female and perfect flowers are produced singly or in groups of a few in the axils of the upper leaves. The one-seeded, fleshy fruit ripens in autumn. The smooth, reddish-brown bark forms rows of small scales. The tough, elastic wood is used in jinrikishas in Japan. It has no commercial value in this country where the tree is used only for ornamental purposes. Although Zelkova has been found susceptible to Dutch elm disease when inoculated with the fungus, it is relatively free of diseases and insect pests in the United States.

Adapted from Illinois Trees: Selection, Planting and Care, by J. C. Carter, Illinois Natural History Survey.

VAS 5001